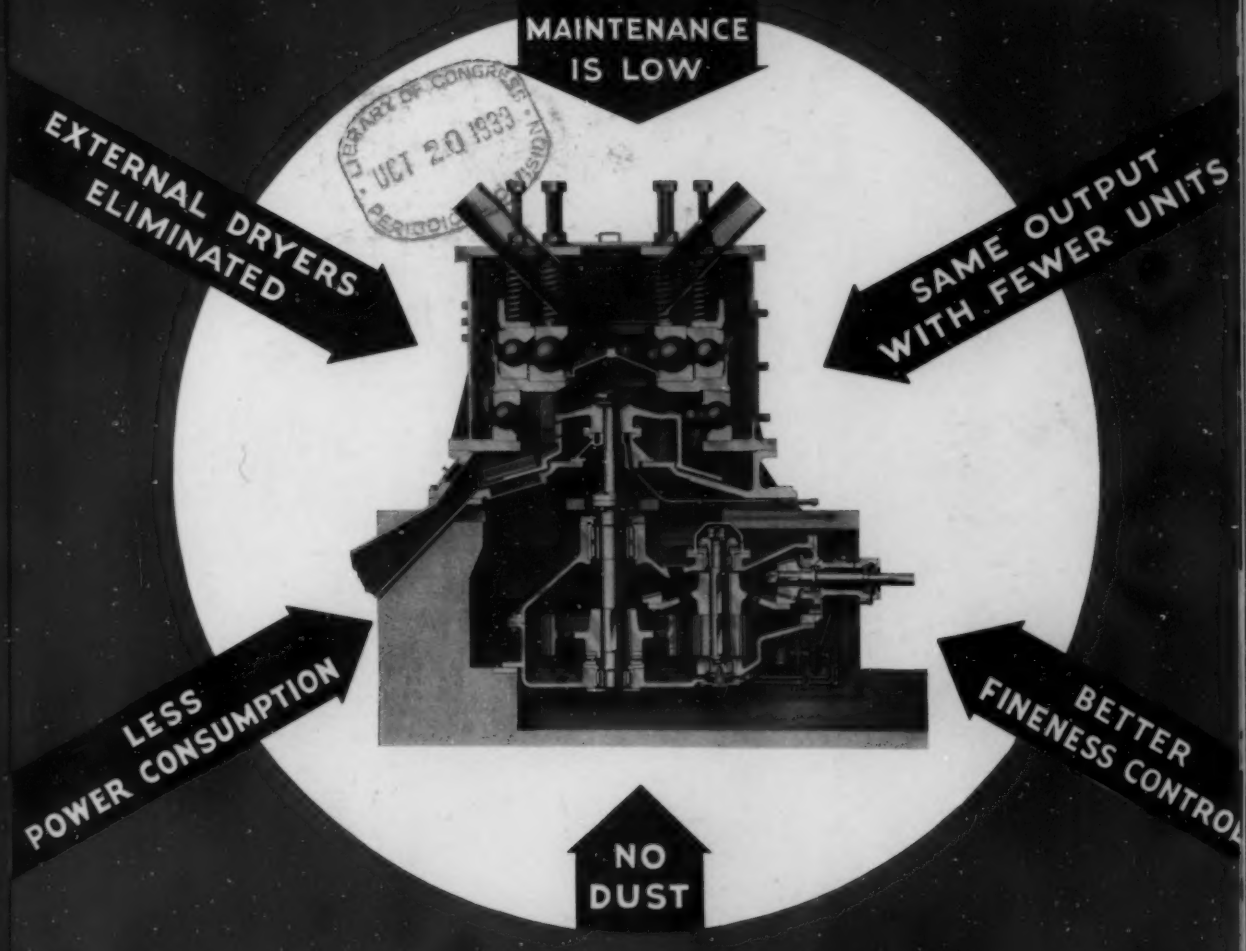
Rock Products

THE INDUSTRY'S RECOGNIZED AUTHORITY

OCTOBER, 1939

B & W Closed-Circuit System for Raw Material and Clinker Grinding



THE BABCOCK & WILCOX CO. . . . 85 LIBERTY STREET . . . NEW YORK, N. Y.

BABCOCK & WILCOX

LIBRARY OF CONGRESS OCT 20 1939 PERIODICAL

LINE UP YOUR 1940 EQUIPMENT

Get this Guide FREE

● Time to look over your plant — get your equipment all lined up so that 1940 will be a big money-making year. Here's just what you need to do the job right — the Telsmith Equipment Guide.

It will tell you *what's new* in rock, ore and gravel handling machinery — exactly which type, model or size best fits your special need... and why. 36 pages ...with illustrations to tell you what words can't. And it's yours, *free for the asking!*

You'll want to see Telsmith's new developments — equipment that embodies every modern feature of design — from the standpoint of speed, capacity, trouble-free operation and lower up-keep.

And you will want to know about Telsmith Balanced Service, too. Telsmith's alert, experienced engineers will plan and equip your plant throughout — completely co-ordinate its operation — *and guarantee results.* Get Telsmith's Equipment Guide E-11.

SMITH ENGINEERING WORKS
508 EAST CAPITOL DRIVE • MILWAUKEE, WISCONSIN

Associates in Canada:
Canadian Vickers, Limited, Montreal—Gordon Russell, Ltd., Vancouver

50 Church Street, New York City
211 W. Wacker Drive, Chicago, Ill.
713 Commercial Trust Bldg., Philadelphia, Pa.
81 Binney St., Cambridge, Mass.
Brandeis M. & S. Co., Louisville, Ky.
Vem Wheeler Equip. Co., Columbus, Ohio
Roanoke Trac. & Equip. Co., Roanoke, Va.
Choctaw C. & M. Co., Memphis, Tenn.

EC-2-39

TELSMITH

"HOW CAN WE PRODUCE MORE CRUSHED MATERIALS?"

"HOW CAN WE PRODUCE SMALLER CRUSHED MATERIALS?"

"WHAT TYPE OF CRUSHER SHOULD WE USE? and WHY?"

Are these your questions? If so, you will find the answer in this booklet. It was written to explain the purpose of different types of crushers, and to point out the advantages of each.

It is a frank discussion of the various crushers in common use; Gyratory—Blake—Hammermill—Overhead eccentric—Cone—Roll—and Fine Gyratory.

If you are interested in crushing — or if you have a crushing problem, you will want a copy of this booklet. The supply is limited, so send the coupon now. It's free and there is no obligation.

PIONEER
ENGINEERING WORKS
1515 Central Avenue · Minneapolis, Minn.

WRITE YOUR NAME AND ADDRESS IN HERE - - -

Pioneer Engineering Works, Inc.
1515 Central Avenue · Minneapolis, Minn.

Here's your copy of
"FACTS YOU WANT ABOUT SECONDARY CRUSHING"

_____

_____

_____

MAIL THIS COUPON TO PIONEER ENGINEERING WORKS

Dept.-D

OCT 10 1939
©CIB 431162

NEXT MONTH'S ISSUE

In the November issue there will appear an interesting article about the modernization of a large cement plant in the Philippine Islands involving an expenditure of more than $1,000,000. Another will describe the Diesel truck operating and maintenance practices of a large Pacific Coast aggregates producer. Economical methods of mining and hauling limestone will be illustrated, and some of the latest practices in the grinding of silica flour will be described. The two important series of articles on sand classification by Edmund Shaw and stone crushing methods and specifications by Elwood T. Nettleton will provide some very practical information.

Modernize Cement Mill

By duplicating grinding equipment and adding a new kiln, a large cement company in the Philippine Islands has tripled its capacity for the production of finished cement. The methods of installation and present flow sheet should be of particular interest at this time.

Silica Flour

Increasing uses are being found for silica flour, and this branch of the industry has made some very definite strides in providing equipment which will meet the demands for these products. To reduce costs to a minimum, new grinding equipment has been added by one concern and a unique system of conveying the fine flour into freight cars to reduce dust has been installed.

Increasing Pump Capacity

Development of a pump jet has been instrumental in increasing the pumping capacity of a sand dredge. A description of the jet's operation and how it is applied to increase capacity is described in this article.

Ready Mixed Concrete

Two articles will describe ready mixed concrete plants; one in the South and the other in the far West. The equipment for accurate weighing of aggregates, cement, and water for economical concrete mixes that meet strength specifications, and the selling methods used are subjects which should provide information of practical value to those interested in this growing field of the rock products industry.

Concrete Products

Steam curing, light-weight aggregate, and high productive capacity machinery have been important factors in lowering costs of concrete block manufacture for one company. A concrete vault manufacturer in the South has worked out a procedure for obtaining maximum strength by accurate control of the cement-water ratio. Sales of a wide variety of concrete products are promoted by one manufacturer through the use of a complete concrete home owned by his foreman for demonstration purposes.

ROCK PRODUCTS

RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

With which has been consolidated the journals *Cement and Engineering News* (founded 1896) and *Concrete Products* (established 1918)

VOL. 42, No. 10

Contents for October, 1939

Humanitarian slant on obsolescence—*Nathan C. Rockwood* 23
California's new cement plant has some unusual features—*Bror Nordberg* 24
Make many sizes at low cost—*A. R. Amos, Jr.* 29
Easy to meet all specifications with new plant—*Ralph S. Torgerson* 33
Remote control for gypsum calcining kettles—*R. O. Klotz* 35
How much does it cost?—Part 2—*Kelsey D. Howington* 37
Mineralizers in cement—*E. P. Flint* 40
Washing and classifying sand—Part 6—application of the classification laws and principles—*Edmund Shaw* 43
How accurate are sieve tests?—Part 7 on crushing, sizing, testing and specifying aggregates—*Elwood T. Nettleton* 45
Most modern lime plant—*Victor J. Azbe* 47
Rubber and its substitutes—*Nathan C. Rockwood* 51
Find new uses for cast stone—*Bror Nordberg* 59
Mass production of concrete shingles 63
From sand-lime to concrete—*Ralph S. Torgerson* 67

Departments

Classified Directory of Advertisers 84
Concrete Products 57
Editorial Comments 23
Hints and Helps 54
Index to Advertisers 104
National Association Activities 53
New Machinery and Equipment 72
News of the Month 74
Personalities 56
Traffic and Transportation 69

ROCK PRODUCTS is owned and published by the Tradepress Publishing Corporation. Publication offices, 205 West Wacker Drive, Chicago, Ill., Telephone—Central 0670.

EDITORIAL STAFF—Nathan C. Rockwood, Editor; Ralph S. Torgerson, Managing Editor; Bror Nordberg, Associate Editor; Frank Richter, Assistant Editor.

CONTRIBUTING EDITORS—Victor J. Azbe, St. Louis, Mo.; Dr. F. O. Anderegg, Newark, Ohio; John M. Cox, San Jose, Calif.

FIELD REPRESENTATIVES—A. B. Maynard and C. P. Teats.

ADVERTISING REPRESENTATIVES—George M. Earnshaw, Eastern Manager, 522 Fifth Ave., New York City, Tel. Murray Hill 2-7888; Richard M. Ward, 2123 East 9th St., Cleveland, Ohio, Tel. Main 9645; Louis C. Thaon, Western Representative, Chicago office, Tel. Central 0670; and Don Harway and Co., West Coast Representative, 155 Montgomery St., San Francisco, Calif., Tel. Exbrook 6029, and 318 W. Ninth St., Los Angeles, Calif., Tel. Tucker 9706.

BUSINESS STAFF—George C. Williams, Vice-president and General Manager; Ralph G. White, Advertising Manager; and L. V. Rodda, Circulation Manager.

LONDON OFFICE—Donald F. Hunter, Manager, 2, 3, 4 Cockspur St., S. W. 1, England.

INDEXED in the Industrial Arts Index Published Monthly. Subscription Price: United States and Possessions, Mexico, Cuba, Canada, $2.00; and $4.00 to foreign countries. Twenty-five cents for single copies.

TO SUBSCRIBERS—Date on envelope indicates issue with which your subscription expires. In writing to have address changed, give old as well as new address.

ROCK PRODUCTS Bears the Twin Hall-Marks of Known Value.

Audit Bureau of Circulations

Impartial measurement of reader interest in terms of paid circulation.

Authentic facts relating to editorial scope and readership analysis.

ABP

(PUBLISHED MONTHLY)

Entered as second-class matter, Jan. 30, 1936 at the Chicago, Ill., postoffice under the Act of March 3, 1879. Copyrighted, 1939, by Tradepress Publishing Corporation

TAKE A TIP FROM THE ARMY

FOR MODERN SPEED IN HAULING!

Today the U. S. army is *modern*—it is motorized AND mechanized. Governments have built thousands of miles of highways to facilitate the movement of *motorized* units to the scene of battle. They have spent millions of dollars to *mechanize* with tanks and armored cars for the actual fighting on the battlefields where no highways exist.

Take a tip from the army: Motorize with trucks where you have a pavement or its equivalent—a smooth road. Mechanize with ATHEY FORGED-TRAK TRAILERS where there is no highway . . . where you need to maintain consistent speed through mud, rock, sand, snow, and ice. For Athey Forged-Trak Trailers give you consistent, profitable hauling speed OFF THE PAVEMENT . . . where motor trucks would be helplessly mired . . . where rubber-tired wheels would slip on clay . . . spin on ice . . . dig deep ruts in mud or be damaged on rock.

Its profitable—to mechanize with Athey Forged-Trak Trailers, pulled by "Caterpillar" Diesel Tractors. Get the whole story from your "Caterpillar" dealer or write us direct:

ATHEY TRUSS WHEEL CO., 5631 W. 65th St., CHICAGO, Ill.
Cable Address: "TRUSSWHEEL" Chicago

FLASH!

Many of the Contractors working on the Pennsylvania Turnpike Highway have mechanized their jobs with Athey Forged-Trak Trailers and "Caterpillar" Diesel Tractors.

MECHANIZE TO KEEP THE LOADER SWINGING

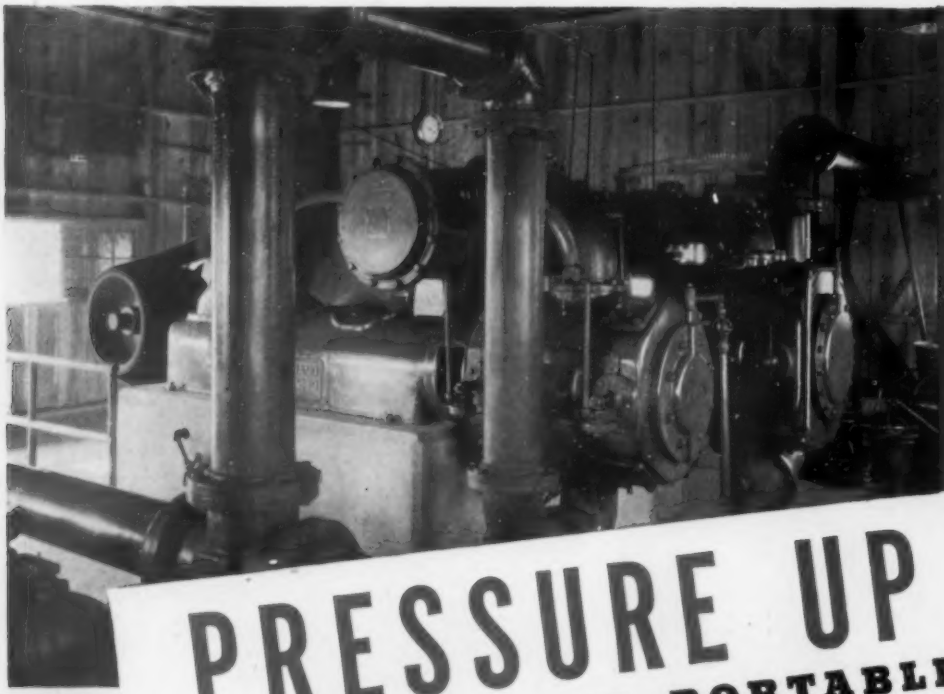
TO PREVENT—"Pile ups" of hauling equipment stopped by mud, rock, sand, or slippery going.

TO PREVENT—"Partial Loads" in an effort to nurse Motorized Equipment "to work."

TO INSURE—Uninterrupted hauling cycles allowing maximum loader output.

The broad, flat tracks of Athey Forged-Trak units stay on top of the mud—provide a roadway over rock—over snow and ice—over slippery clay. It's a firm roadway for your big, heavy loads—a "steel highway" that brings consistent speed regardless of bad going.

MECHANIZE WITH ATHEY FORGED-TRAK TRAILERS



INGERSOLL-RAND 20 and 12½ x 14 inch, 200 h. p., 600 r. p. m., XCE-2 Air Compressor. Texaco Alcaid, Algol or Ursa Oils will help keep this and other makes and types of compressors working efficiently.

PRESSURE UP

STATIONARY OR PORTABLE

GARDNER-DENVER 315 cu. ft. per minute Diesel driven Portable Compressor. Users of Texaco Compressor Oils report compressors stay clean, continue to perform efficiently. The Texaco Ursa Series is also ideal for Diesel lubrication.

KEEPING AIR PRESSURE UP is a matter of free acting valves and piston rings.

You will have no trouble in keeping air pressure up, once you commence to lubricate your compressors with Texaco.

Using Texaco Alcaid, Algol, and Ursa Oils, what little carbon forms is soft and harmless. Valves keep clean, free from carbon and gummy deposits. They open wide, seat snugly, continue to operate perfectly on full or partial loads.

Experienced lubrication engineers, trained in the selection and application of Texaco Air Compressor Lubricants will be glad to demonstrate that savings can be made with Texaco Perfected Lubrication.

For prompt engineering service and deliveries, phone the nearest of our 2279 warehouses in the U. S., or write: The Texas Company, 135 East 42nd Street, New York City, N. Y.

Texaco Dealers invite you to tune in The Texaco Star Theatre—a full hour of all-star entertainment—Every Wednesday Night—Columbia Network—9:00 E.S.T., 8:00 C.S.T., 7:00 M.S.T., 6:00 P.S.T.

TEXACO ALCAID, ALGOL and URSA OILS

PERFECTED LUBRICATION FOR AIR COMPRESSORS

new 604

A NEW SHOVEL BY KOEHRING . . . new design, modern construction with many features for lower operating and maintenance costs . . . increased yardage . . . more operating ease. Enclosed gears running in oil, anti-friction bearings, forced-feed lubrication, welded construction, less weight, greater strength, high speed are a few of the important reasons why the new Koehring 604 is a profitable investment. A new catalog, giving complete description of this new Koehring Shovel, illustrates the outstanding progress made in shovel design. Write for it today.

KOEHRING CO.
MILWAUKEE • WISCONSIN

- HIGH SPEED
- ENCLOSED GEARS
- ANTI-FRICTION BEARINGS
- WELDED CONSTRUCTION
- LIGHT WEIGHT

mail the coupon

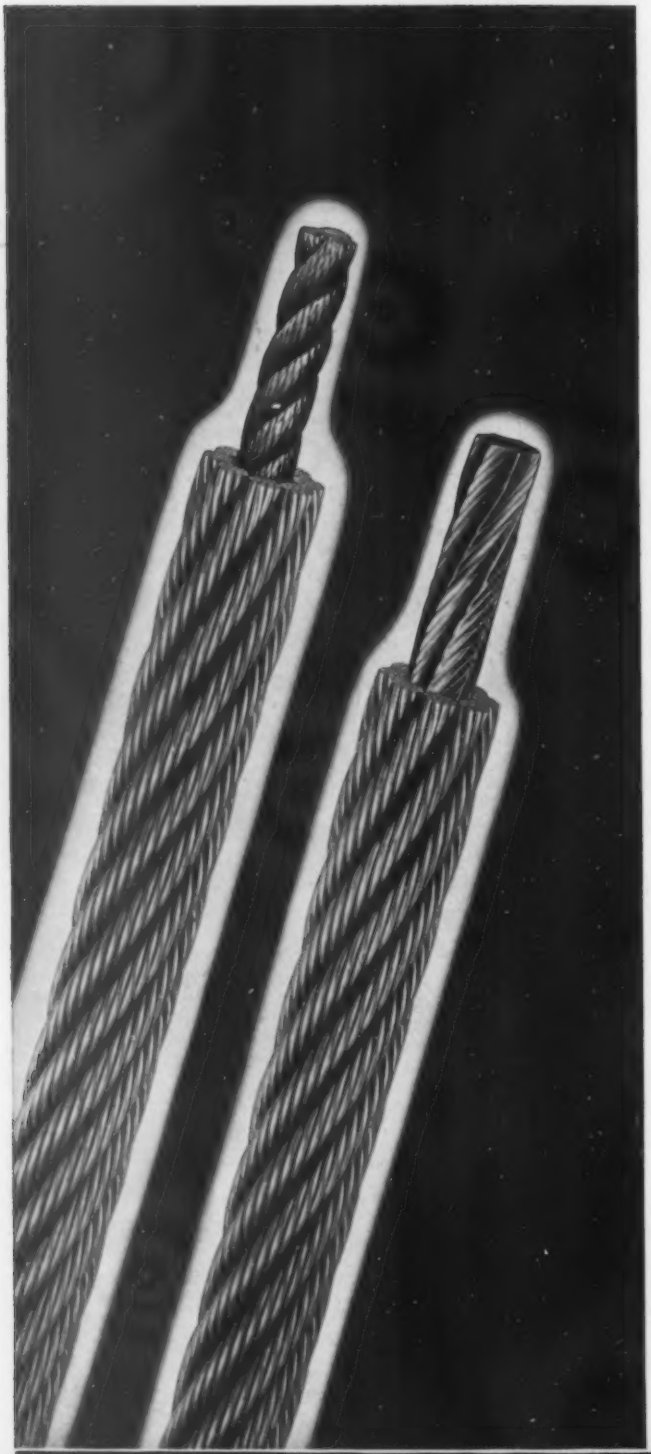
SEND NEW 604 CATALOG TO

COMPANY NAME _____
BUSINESS _____
SIGNED BY _____
TITLE _____
STREET ADDRESS _____
CITY _____ STATE _____

HEAVY-DUTY CONSTRUCTION EQUIPMENT

PURPLE-STRAND *FORM-SET* WIRE ROPE

BETHLEHEM Specify FORM-SET PRE-FORMED ROPE



A choice of 2 centers

THE real importance of centers in wire rope is not universally recognized. Steel wires, made into strands, support loads and supply the strength. But these strands must be held apart so that they won't "lock," wear and grind as they wind on drums or run over sheaves. The center or core handles this highly important job and the life of a wire rope depends on its performance as much as on that of the steel. Bethlehem offers two types of centers: the standard hemp core and the independent wire-rope center.

Hemp. For years this hard, tough core of hemp or other fiber has been standard in many types of ropes. The core of Bethlehem wire rope is specially lubricated with a compound that keeps the fiber pliable and resistant to moisture. This type of core is widely used in lines where highest strength and resistance to crushing is not required.

IWRC. For heavy loads, nothing can take the place of an independent wire-rope center. It adds 10 per cent to the strength of the rope. It greatly increases resistance to crushing and distortion, both on the drum and over sheaves. While the rope is stiffer to handle, it is just as flexible under load and because of its resistance to crushing it receives. less damage in running over small sheaves than fiber-center rope. Bethlehem uses a specially designed wire rope as the center, an independent rope made just as carefully and with just as great precision as the wire rope itself. It carries its own specially compounded lubricant. In Form-Set line the center is also pre-formed. Strands are accurately fitted around the center to give full, adequate bearing surface. The cost is 15 per cent more.

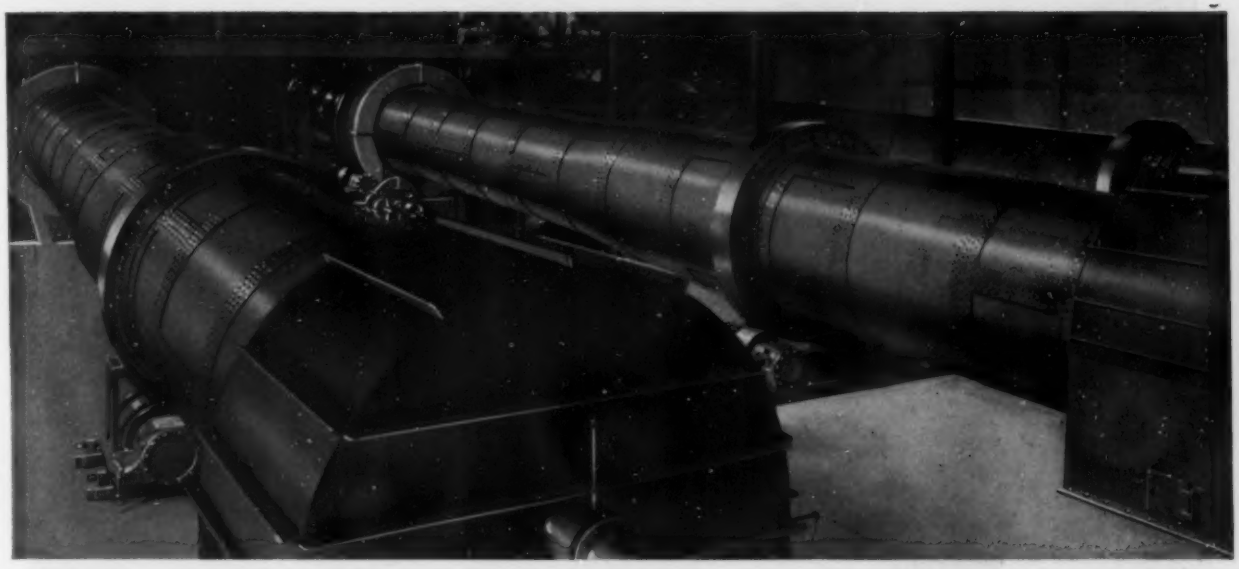
All Purple-Strand Form-Set wire rope is precision designed. Only the finest, premium-priced steels are used. Every step in the making of Purple-Strand is a result of half a century's study of wire-rope problems, three-quarters of a century's experience in making fine steel.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

for highest efficiency, specify

TRAYLOR



KILNS, COOLERS AND DRYERS

WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators

Welded or Riveted Stacks, Tanks and Bins for any purpose.

For many years, Traylor Rotary Kilns, Coolers and Dryers have been making extra profits for leading American and foreign cement plants, lime plants and other process industries.

As it is with everything, there are reasons for this wide popularity, principal among which is that Traylor equipment costs no more than ordinary kinds, is built for long life and delivers at more-than-expected efficiency. And now, with our highly developed scientific welding technique we give greater value than ever before, for money expended.

Prospective purchasers are invited to investigate these claims closely before making commitments, and to that end we suggest calling in one of our technicians for consultation. Available at any time!

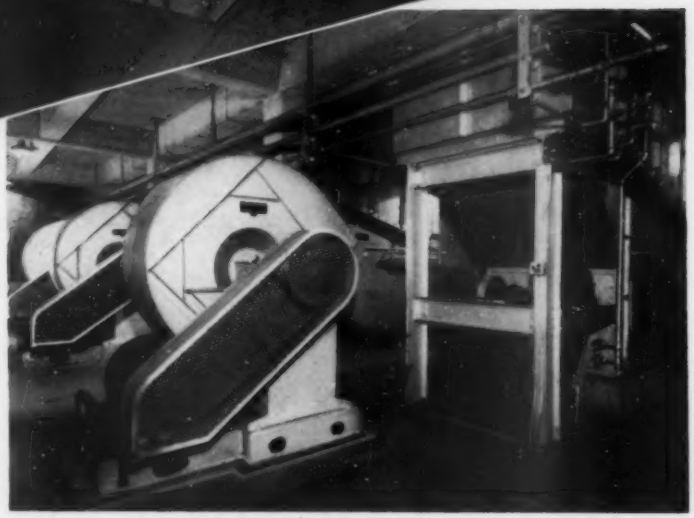
TRAYLOR ENGINEERING & MANUFACTURING CO.

ALLENTOWN, PENNSYLVANIA, U.S.A.

NEW YORK CITY 3916 Empire State Bldg.
CHICAGO 815 One La Salle Street Bldg.
SALT LAKE CITY 101 West Second South St.
LOS ANGELES 919 Chester Williams Bldg.
SEATTLE 6211 22nd Ave., N. E.
THE CANADIAN FAIRBANKS-MORSE CO., LTD. 980 St. Antoine St., Montreal, P. Q. Canada
B. C. EQUIPMENT CO., LTD. Vancouver, B. C., Canada
MAQUINARIA INTERNACIONAL S. R. L. Av. Francisco I. Madero No. 17, Desp. 214, Mexico, D. F. Mexico
MANILA MACH. & SUPPLY CO., INC. Manila and Baguio, P. I.

Export Department—104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Oruro

3 FULLER



Above: Three Fuller Coolers showing discharge ends.

Right: Drives and fans installed on these same coolers.

FULLER COMPANY

CHICAGO—1118 Marquette Bldg.

AIR-QUENCHING COOLERS
IN SERVICE

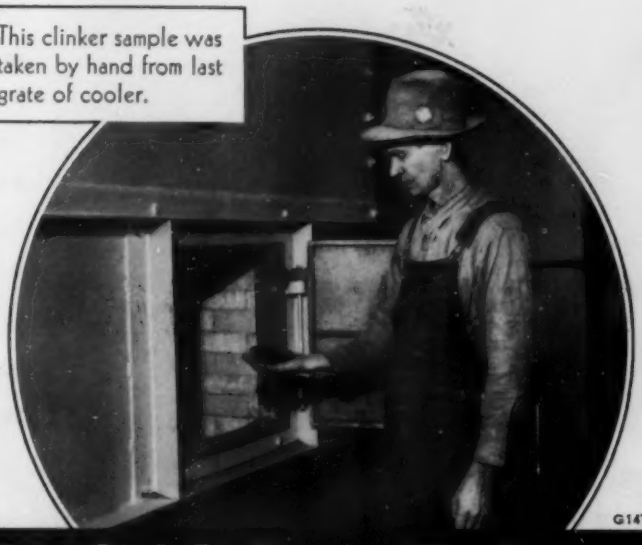
and now

5 More

units purchased for installation in two other plants of the same Portland cement company.

FEATURES OF
FULLER AIR-QUENCHING COOLER

- Abrupt chilling for production of clinker of high glass content
- Mechanically simple; requires comparatively little maintenance
- Grates are water cooled; fixed grates alternate with moving grates
- High and uniform combustion air temperatures
- Operation under direct observation at all times
- Drive mechanism simple; outside of cooler
- Low power requirements

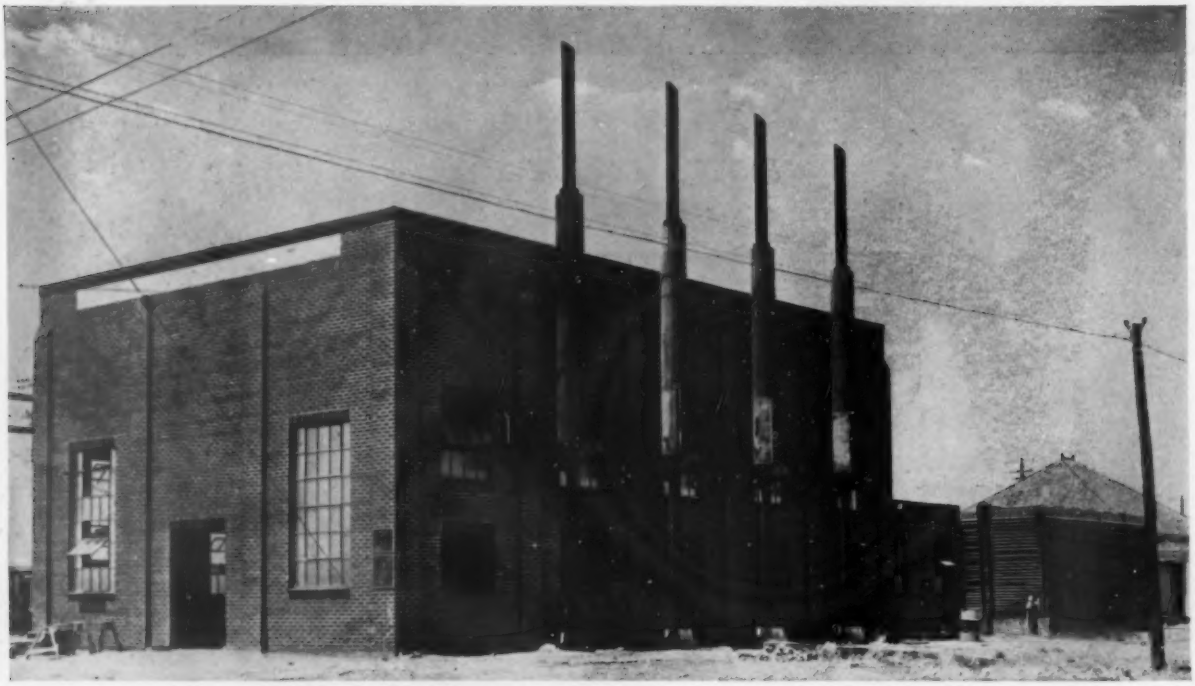


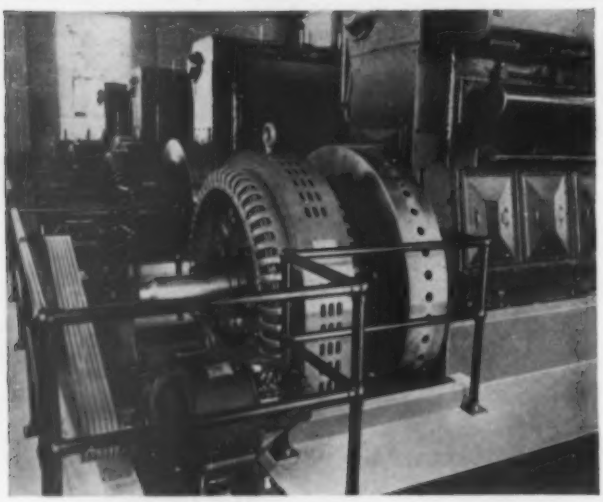
This clinker sample was taken by hand from last grate of cooler.

G14T

CATASAUQUA, PA.
SAN FRANCISCO—320 Chancery Bldg.

Somebody Is Saving On Power Wherever You See Diesel Exhaust Stacks!





This plant contains four Superior Diesels —all the same size and type for flexibility and interchangeability of parts.

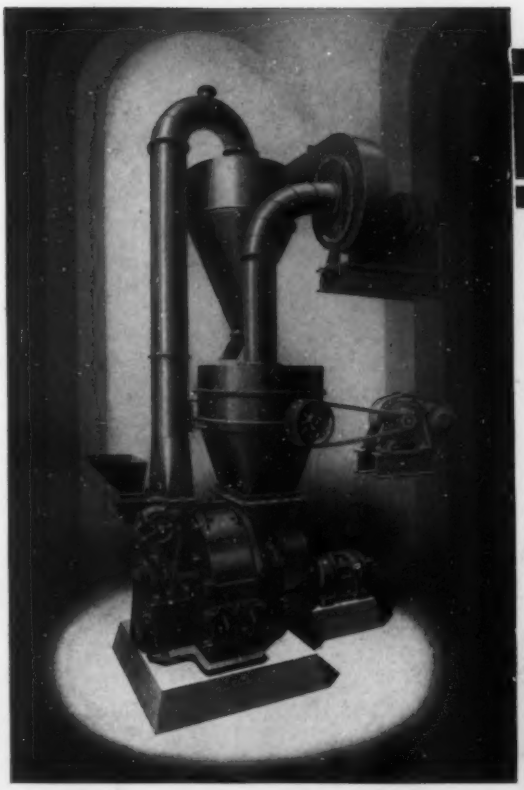
Somebody has used good judgment in buying when you look inside the plant and find Superior heavy duty Diesels, because these engines are designed for low operating and maintenance cost and years of dependable service.

Find out about these engines if your power costs more than one cent per KWH!

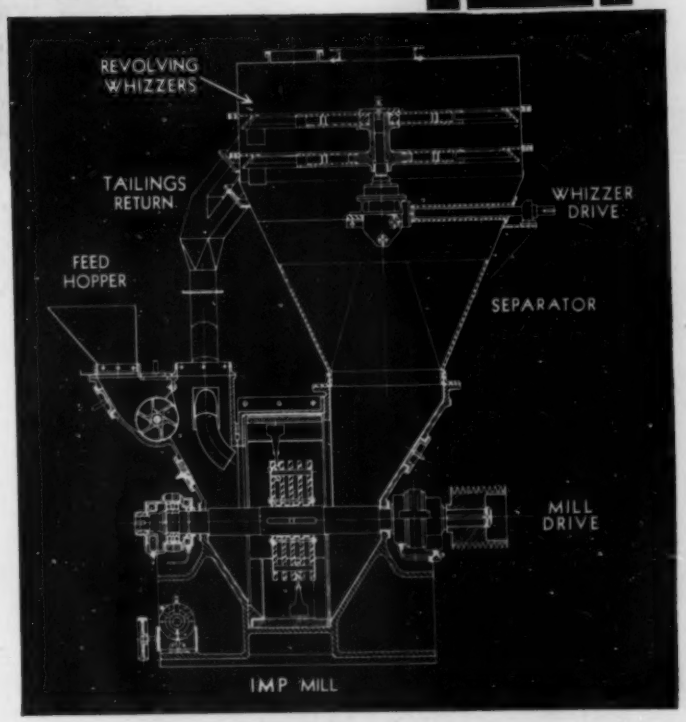
★ ★ ★

THE NATIONAL SUPPLY COMPANY . . . SUPERIOR ENGINE DIVISION

FACTORIES: Springfield, Ohio; Philadelphia, Pa. · SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Houston, Texas.



IMP MILL with WHIZZER



Cross-section of Imp Mill showing details of Whizzer. Driven through variable speed transmission, permitting wide range classification, simply by changing the speed . . . any fineness instantly, from 60% passing 100-mesh up to 99.5% through 325-mesh.

THIS combination unit offers the well known grinding economy of the Raymond Imp Mill plus the flexible fineness control of the Whizzer Air Separator.

It works equally well on dry products, or on high moisture materials when it is equipped with a Flash Drying System.

You can pulverize various chemicals, pigments, bauxite, kaolin, talc, phosphate materials and other non-metallic minerals to uniform fineness at new low costs.

Calcining gypsum, drying washed clays, producing fine grades of phosphate materials, grinding coal, pulverizing and firing pitch to kilns . . . are just a few of the many uses of this versatile mill. If you have a grinding, drying or separating problem . . . look into the advantages of the Raymond Imp Mill.

Write for New
CATALOG No. 41

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1307 North Branch Street CHICAGO
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

The CRUSHER that can take it

Two weeks collection of tramp iron which passed through a 7 foot Symons Short Head Cone Crusher . . . The largest piece measured 1½"x3"x14".

UNTIL THE ADVENT OF THE SYMONS CONE CRUSHER

tramp iron had long been a source of worry to those engaged in fine crushing. Here is what one operator had to say. "Shutdowns were frequent, costs were uncertain because of enforced delays due to excessive breakage. Plugged machines had to be freed continually with a torch to cut out frozen and wedged-in tramp iron. The Cone Crusher overcame these troubles, helped reduce and stabilize costs." The best evidence of this statement is the universal acceptance of the Cone as the outstanding crusher in its field.

While tramp iron is not recommended as a regular diet for a Cone Crusher, its construction is such that damage will not result should any ordinary non-crushable material get into the crushing cavity. The band of heavy coil springs encircling the frame allows the bowl to lift from its seat with each movement of the head until such non-crushable objects pass off into the discharge. The tramp iron shown in the accompanying illustrations passed the protective devices installed for its removal, and would have resulted in expensive repairs and long shutdown periods for any crusher except the Symons Cone.

NORDBERG MFG. CO. *Milwaukee, Wis.*

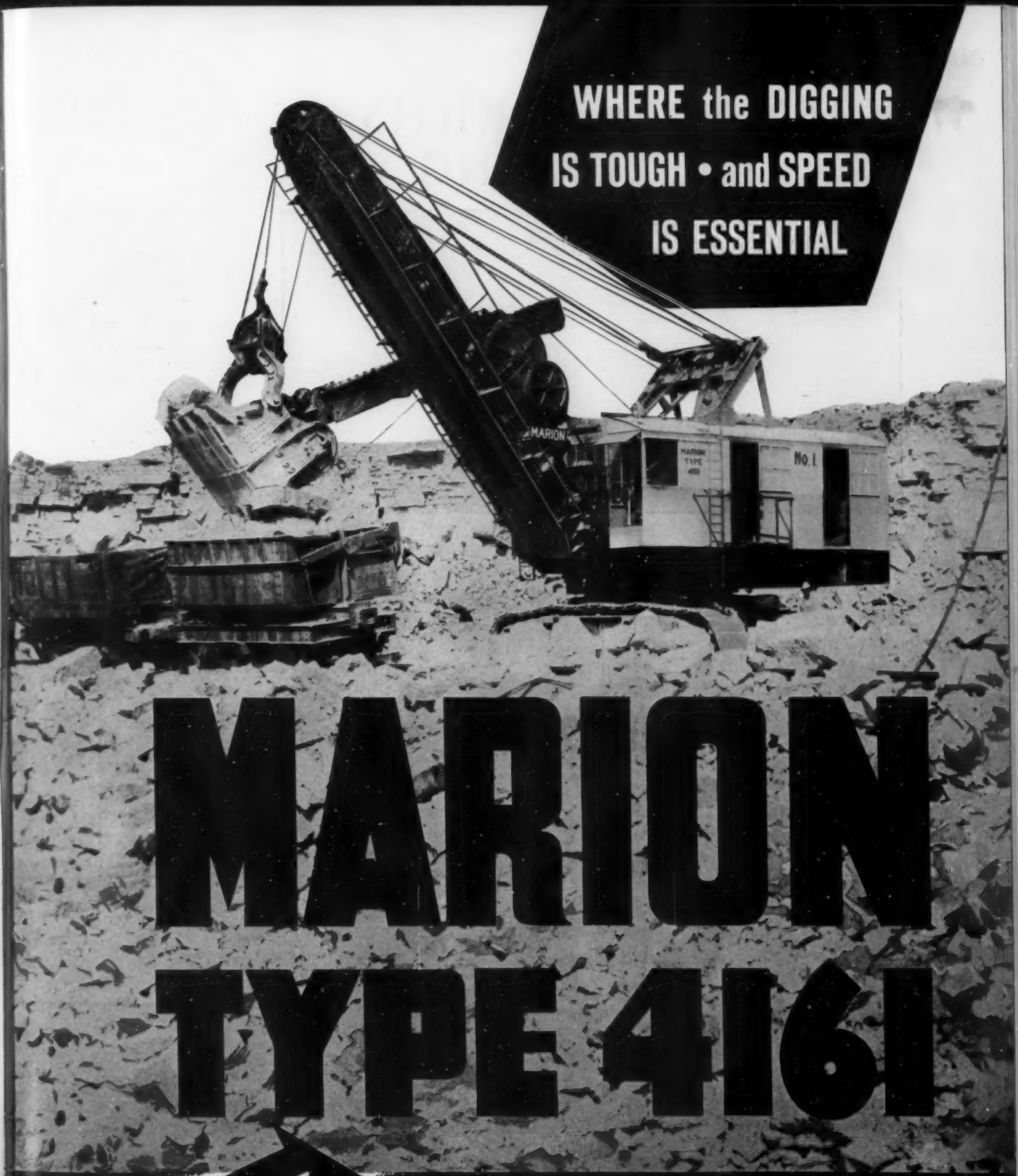
NEW YORK CITY
60 East 42nd Street

LOS ANGELES
Subway Term. Bldg.

TORONTO
Concourse Bldg.

LONDON
Bush House

SYMONS CONE CRUSHERS



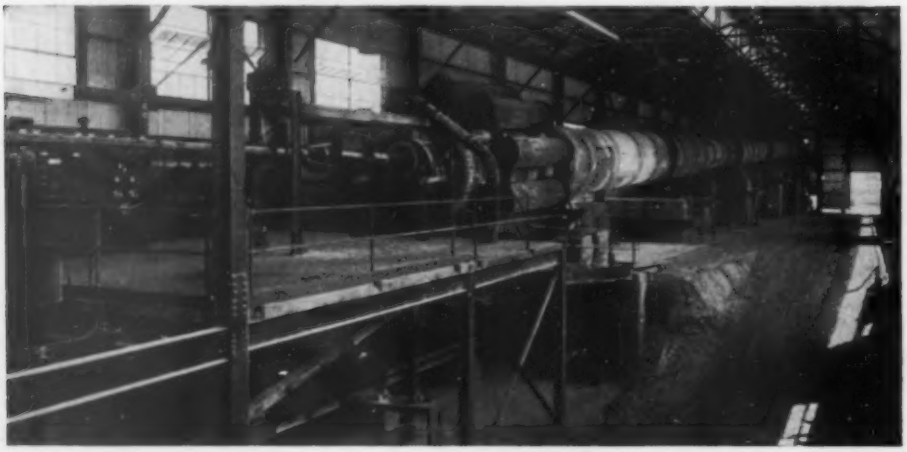
MARION TYPE 461

MODERNIZE with MARIONS

Open pit mining . . . quarries . . . ore handling . . . hydro-electric developments . . . and heavy construction is the work picked out for this sturdy, heavy duty Marion . . . one of the most popular in the MARION line. Its long suit is maximum yardage at low operating cost. Write for Bulletin 369 which gives you the facts about this machine. There is a MARION of the right size and capacity . . . from 3/4 cu. yd. up. . . . for every material handling job.

THE MARION STEAM SHOVEL CO., MARION, OHIO, U. S. A.

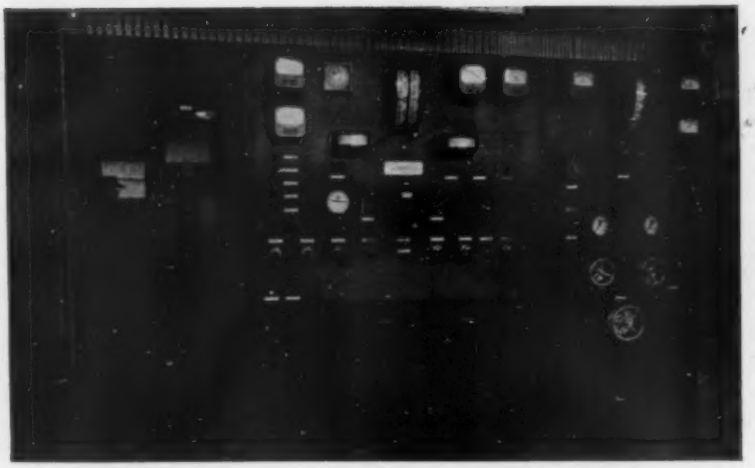
UNAX ROTARY KILNS FOR LIME BURNING



The advantages of the Unax Rotary Kiln are:
Low fuel consumption.
Reduced cost of production.
Better quality and greater uniformity of product.

● **The Kiln illustrated is installed in the lime plant of H. E. Millard, Annville-Penna.**

THE modern, efficient **Unax Rotary Kiln** for calcining lime is the result of our many years experience in manufacturing and engineering hundreds of rotary kilns in such industries as cement, ore, lime, chemical, etc.



The **Unax Cooler** is integral with the kiln and provides efficient cooling of the calcined material by means of the air for combustion which thereby becomes pre-heated to a high degree.

The **FLS Centralized Kiln Control** concentrates at one convenient point the control switches of the kiln and auxiliary equipment, sequence interlocks, alarms, signals, and instruments showing speeds, draft, temperatures, etc., constantly presenting to the kiln operator a clear, quick picture of the kiln's operation.

The **FLS Gas Analyzer permits** obtaining complete combustion of the fuel while avoiding excess air in the kiln.

F. L. Smidth & Co. are manufacturers of Rotary Kilns, Coolers, Grinding Machinery and auxiliary apparatus, and in addition are Engineer Specialists in designing and equipping plants employing such machinery.

F. L. SMIDTH & CO.
225 BROADWAY Engineers **NEW YORK, N. Y.**

LITTLE GIANTS

50 YDS. AN HOUR!

½-yd. Lorain-30 shovel of G. T. Bramhall, Carrollton, Mo., has averaged 500 yds. of crushed rock per 10-hr. day over a period of 8 months.

KEEPS 'EM ROLLING

This ½-yd. Lorain-33A clamshell of the North Star Washed Sand & Gravel Co., Ithaca, Mich., loads trucks from stockpile with minimum delay.

IT'S LORAIN NO. 2

"Our first Lorain-40 shovel still works so satisfactorily, we decided to buy another ¾-yd. Lorain-40A with independent chain crowd," Southern Hills Sand-Gravel & Excavating Company, Dayton, Ohio.

● You won't sacrifice service for size, if you put any one of the ⅜ to ¾-yd. Lorains in your quarry or gravel pit. True, they are small capacity machines, but that doesn't mean you have to sidestep rock digging or many of the tough jobs usually associated with bigger units.

Every unit in this ⅜ to ¾-yd. line incorporates the same proven principles of Center Drive design in crawler, turntable and shovel boom which have won rock digging fame for the 1½-yd. and 2-yd. Lorains. All are available with interchangeable boom equipment, permitting their use for stockpiling, stripping or pit work.

Write today for catalogs describing these ⅜ to ¾-yd. shovels and cranes. Learn how and why Lorains can offer you a bigger return on your small machine investment.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

THEW CENTER DRIVE

LORAINS

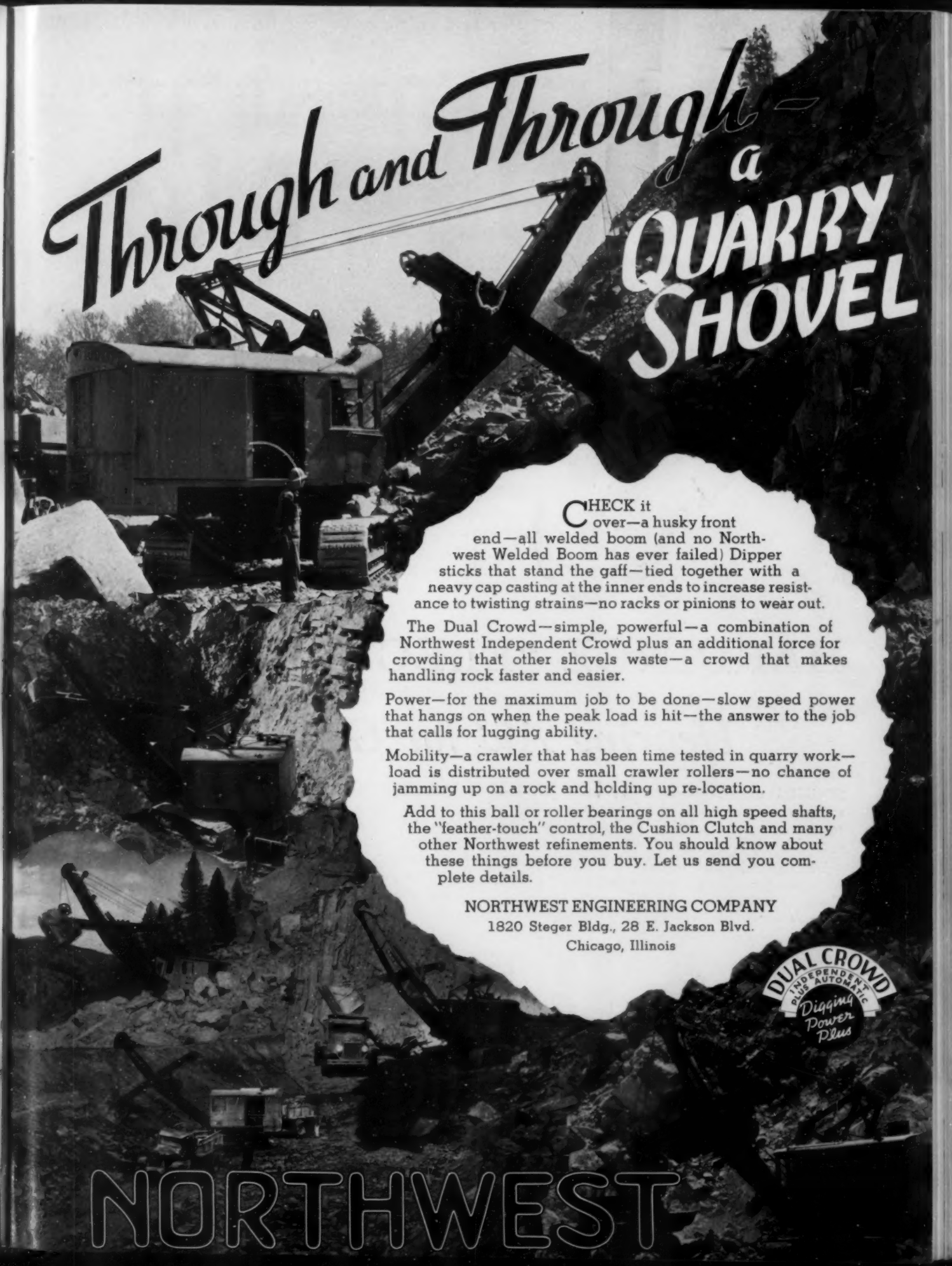
3/8 TO 3/4-YD.

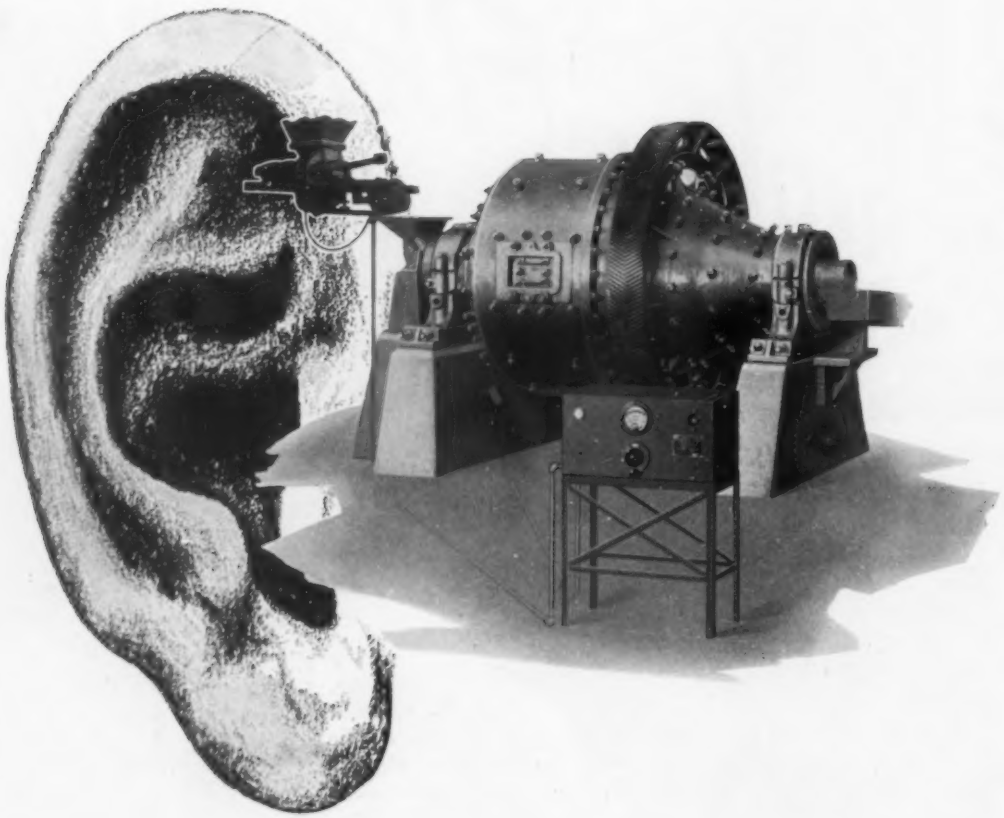
HOW MULTICLONE DUST COLLECTORS SAVE YOU MONEY

Multiclones are the original small tube cyclonic dust collectors. Present installations handle from a few c.f.m. to 200,000 c.f.m. and over. For a given power input, Multiclones have a higher collection efficiency than any other dry cyclonic collector. They are all-metal, fireproof, handle gases at all practical temperatures and minimize the explosion hazard by dividing the gas stream into many small volumes. They are compact, occupy small floor space and headroom and can often be located in space that can be used for no other purpose. No moving parts, nothing to clean, repair or replace. Tube section can be jacketed for recovery of heat. The Multiclone shown here is recovering dust from sand and stone dryer in hot asphalt plant. The 16 tubes are approximately ten times as efficient as a single cyclone of the same overall size. Operated under suction, the fan is protected from the dust. Collection efficiency based on total solids can be as high as 99 percent. Multiclones are used in all industries where fine particles must be collected to eliminate a nuisance or for the recovery of by-products or powders resulting from process operations. For still more efficient performance, write for facts about Cottrell Electrical Precipitators.

RESEARCH CORPORATION
CHRYSLER BLDG., NEW YORK, N.Y.
59 E. VAN BUREN ST., CHICAGO, ILL.

WESTERN PRECIPITATION CORPORATION
1016 W. 9TH ST., LOS ANGELES, CALIF.
405 LEXINGTON AVE., NEW YORK, N.Y.


Through and Through—a QUARRY SHOVEL
CHECK it over—a husky front end—all welded boom (and no Northwest Welded Boom has ever failed) Dipper sticks that stand the gaff—tied together with a heavy cap casting at the inner ends to increase resistance to twisting strains—no racks or pinions to wear out.
The Dual Crowd—simple, powerful—a combination of Northwest Independent Crowd plus an additional force for crowding that other shovels waste—a crowd that makes handling rock faster and easier.
Power—for the maximum job to be done—slow speed power that hangs on when the peak load is hit—the answer to the job that calls for lugging ability.
Mobility—a crawler that has been time tested in quarry work—load is distributed over small crawler rollers—no chance of jamming up on a rock and holding up re-location.
Add to this ball or roller bearings on all high speed shafts, the "feather-touch" control, the Cushion Clutch and many other Northwest refinements. You should know about these things before you buy. Let us send you complete details.
NORTHWEST ENGINEERING COMPANY
1820 Steger Bldg., 28 E. Jackson Blvd.
Chicago, Illinois
DUAL CROWD
INDEPENDENT PLUS AUTOMATIC
Digging Power Plus
NORTHWEST



HARDINGE "ELECTRIC EAR"

(TRADE MARK, REG. U. S. PAT. OFF.)

Hearing Aid for Grinding

SOUNDS unbelievable—but it's here! An automatic, dependable method of controlling the feed to your Mill and regulating it to maintain optimum operating conditions at all times.

The "Electric Ear" consists of a control cabinet with power relay to operate the feeder, and a microphone located close to the Mill. Only one adjustment is needed to regulate the noise level of the Mill. Capacity is increased over best possible manual control, usually in excess of 10%, because the "Electric Ear" compensates automatically for change in hardness, size segregation, or bulking of the feed.

The most revolutionary development in grinding control that has occurred in twenty years.

Write for Bulletin 42.

HARDINGE

COMPANY, INCORPORATED – YORK, PENNSYLVANIA

New York, 122 East 42nd Street Chicago, 205 West Wacker Drive San Francisco, 501 Howard Street Denver, 817 Seventeenth Street

CONICAL MILLS | COUNTER CURRENT CLASSIFIERS | THICKENERS CLARIFIERS | RUGGLES-COLES DRYERS | CONSTANT WEIGHT FEEDERS | TUBE ROD AND BATCH MILLS

"75% CHEAPER THAN WIRE POWER!"

—HONEYHOLE SAND & STONE CO.

Nothing sounds sweeter than the jingling of dollars into the profit till—whether they're wrung from good prices or from savings in operating costs. And when savings run as high as 75%, in an operating item as important as power, it's music indeed!

The Honeyhole Sand & Sone Co., Mountain Top, Pa., makes its power-cost comparisons between two plants — one operated with purchased electricity, the other with the two 80-horsepower "Caterpillar" Diesel Engines pictured here. Together they use only 4 to 5 gallons of 6½c fuel per hour in powering a plant having a 300-to-400-ton capacity per 10-hour day. Maintenance and lubricating-oil add relatively little to the power cost. Compared to their electrically operated plant, "Caterpillar" Power, they estimate, is fully 75% cheaper.

These sturdy, dependable and virtually "self-managed" engines were chosen further because of their compactness, easy installation in most any out-of-the-way location . . . and because there's never any question about getting prompt service when adjustments or replacement parts are needed (which is seldom, indeed)—for no other engines in the world are so completely backed with convenient and efficient service facilities.

NINE SIZES—32 to 160 horsepower
CATERPILLAR TRACTOR CO., PEORIA, ILL.

This D6800 drives a Traylor 4½" Gyratory Crusher and a Crocker-Wheeler 35-kw. generator. Consumes 2½ gallons of 6½c fuel an hour.

This D8800 drives a 10" x 30" Good Roads Roller-bearing Jaw Crusher—using about 2 gallons of 6½c fuel an hour.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

...THAT SHEAVE HAS CHEWED UP ITS LAST WIRE ROPE!

FROM THE DAILY REPORT OF A TIGER BRAND WIRE ROPE ENGINEER

No sooner stepped in here this morning when the super had me by the arm. "Come with me," he said, "I want to show you something."

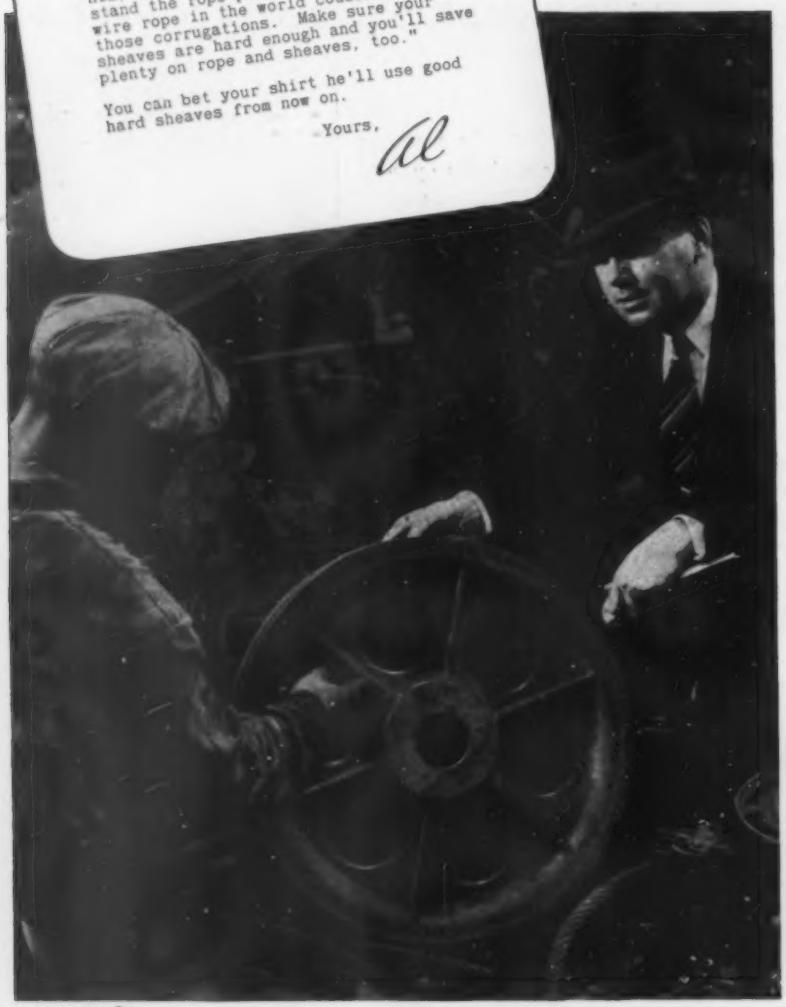
At the scrap pile he pointed at a discarded sheave. "There's a sheave that has chewed up its last wire rope," he said. "Only a few months old but it's already ruined two ropes."

I could see it was badly corrugated. "The trouble with that sheave," I told him, "is that it wasn't hard enough to stand the rope pressure. Why, the best wire rope in the world couldn't last on those corrugations. Make sure your sheaves are hard enough and you'll save plenty on rope and sheaves, too."

You can bet your shirt he'll use good hard sheaves from now on.

Yours,

al



THE material from which a sheave is made should be hard enough to withstand the wear caused by the pressure of the rope on the sheave groove. Sheaves made from too soft material not only wear rapidly, but also shorten the rope life, because the deepened grooves do not provide working clearances for the rope. The resultant pinching of the rope imposes a binding action which prevents proper load distribution, and causes excessive internal and external friction. Corrugations from strand and wire impressions further reduce rope life by accelerating wear.

Limiting values of the pressure between a rope and sheave to secure satisfactory service have been established for all common materials from which sheaves are manufactured. If you are encountering undue sheave wear, our Engineering Department will gladly help you determine the pressure on your sheaves and make money-saving recommendations based on these standards.

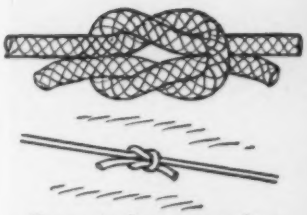
EXCELLAY *Preformed* **WIRE ROPE**

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

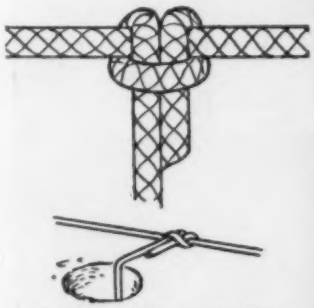
COLUMBIA STEEL COMPANY
San Francisco

United States Steel Products Company, New York, *Export Distributors*

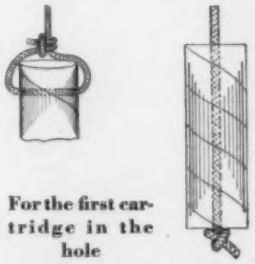
UNITED STATES STEEL



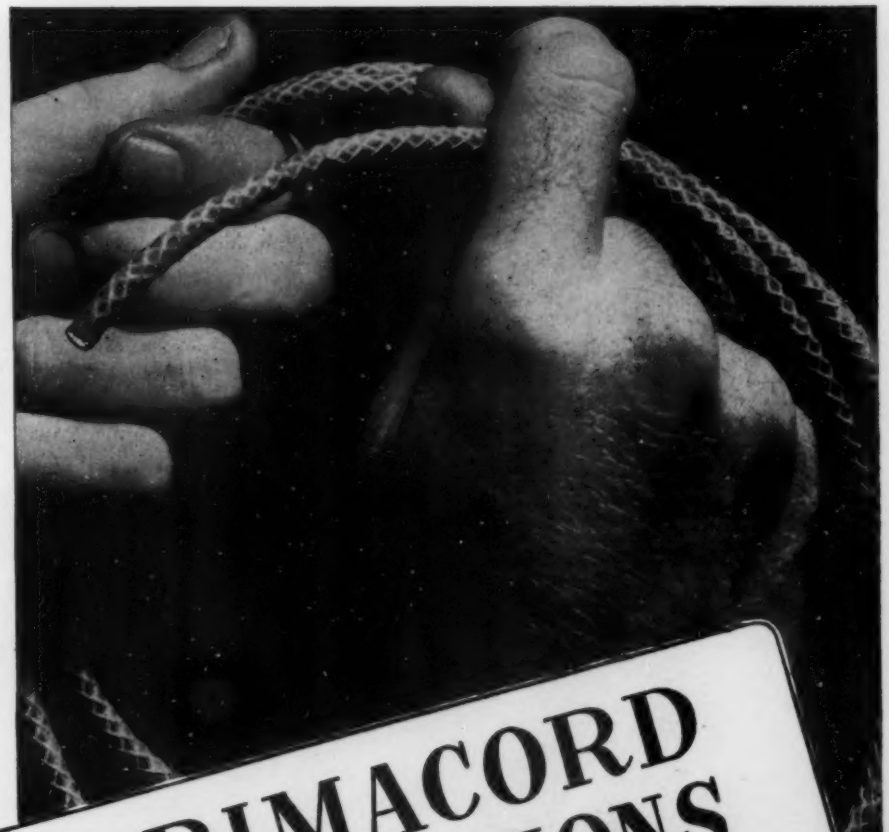
For main line connections use a square knot



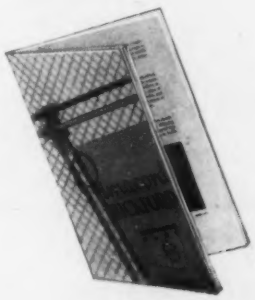
For branch-to-main line connections use a half hitch



For the first cartridge in the hole use either of these tied connections. First make sure that the Primacord is long enough to reach from the bottom to the top of the hole. Spliced or knotted Primacord should not be used in a drill hole, as the exposed ends might come in contact with water under pressure.



PRIMACORD CONNECTIONS ..all made by Hand



Simple, isn't it! For the main line use a square knot. For branch-to-main line use a half hitch. For the first cartridge in the hole use either of the methods shown, with a *continuous* length of Primacord, having *no* connections.

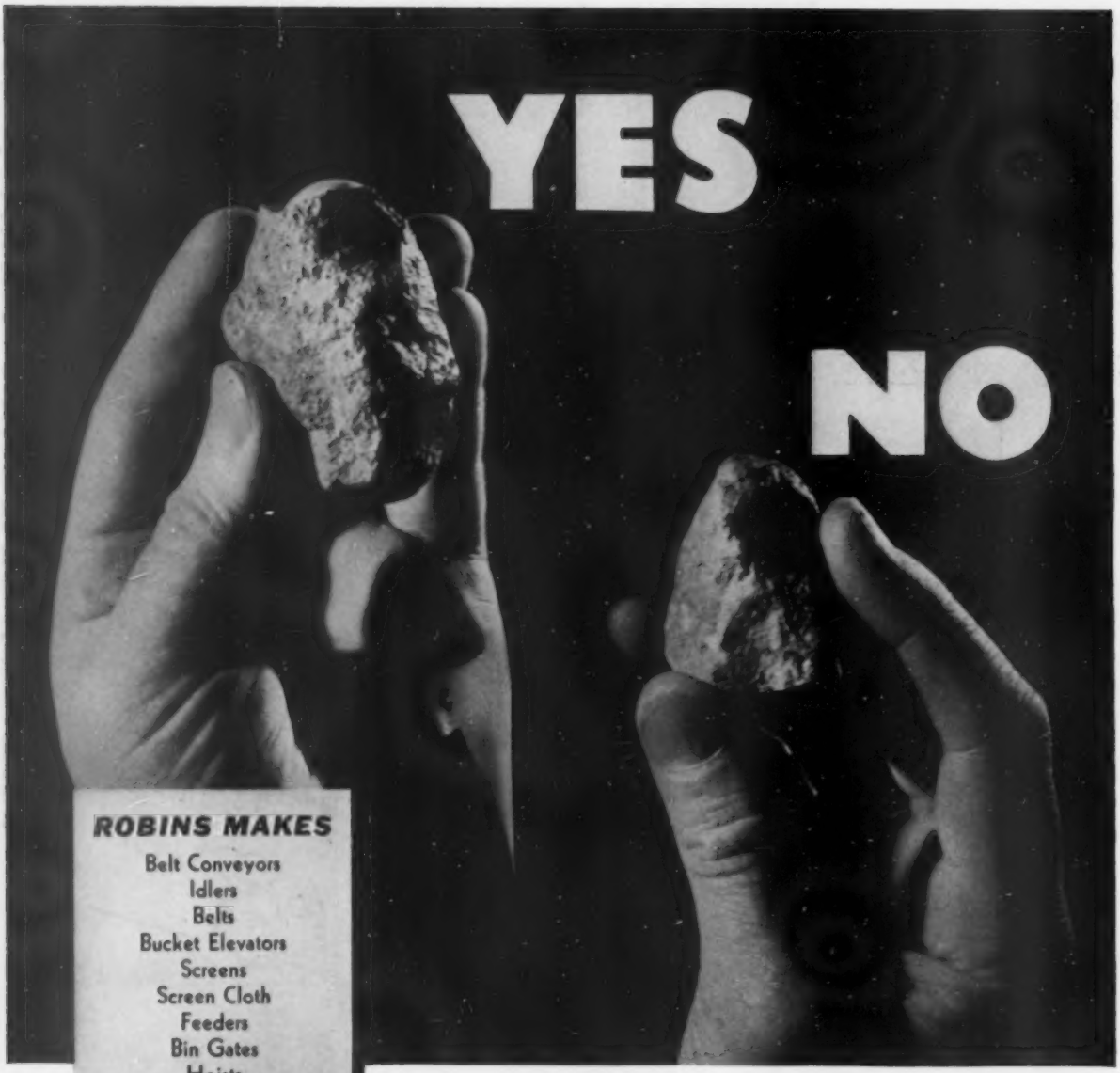
Primacord-Bickford is the *improved* Detonating Fuse with a flexible, waterproof textile cover. It is light, strong, easily handled, and "goes" at a speed of 20,350 feet per second!

Send for a free copy of the Primacord-Bickford book. It opens the door to new efficiency and profits in blasting.

The ENSIGN-BICKFORD COMPANY · Simsbury, Connecticut · U.S.A.
Makers of Cordeau-Bickford Detonating Fuse and Safety Fuse since 1836.

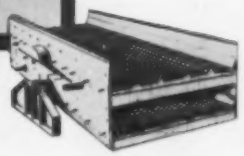
PRIMACORD-BICKFORD *Detonating Fuse*

PBT3



ROBINS MAKES

Belt Conveyors
Idlers
Belts
Bucket Elevators
Screens
Screen Cloth
Feeders
Bin Gates
Hoists
Grab Buckets
and all their accessories
Send for bulletins



A difference in size that a state inspector can't see he'll find with his "yes" and "no" gauges. You can give him the specified size with Robins GYREX, VIBREX, and ELIPTEX Screens. Robins Screens are fast, accurate and use but little power.

ROBINS CONVEYING BELT CO.
15 PARK ROW, NEW YORK, N. Y.
Offices in principal cities

MATERIAL HANDLING ROBINS EQUIPMENT

HUMANITARIAN SLANT ON OBSOLESCENCE

WE are accustomed to think of obsolescence only in terms of operating costs and efficiency. Costs are computed in terms of man-hours, interest on investment, repairs, maintenance expense, lubrication, etc. Efficiency means over-all effectiveness. A piece of equipment may have low operating cost and yet be inefficient if it makes a border-line product which requires constant vigilance to prevent rejections. The determination of obsolescence from these angles is a matter of engineering arithmetic and horse sense. The arithmetic is easy but the horse sense involves many considerations such as a knowledge of what your competitors are doing or contemplate doing, whether business is going to be good or bad, money easy or hard to get, etc.

There is another side to obsolescence that may often involve just as much in the way of dollars and cents, yet is not often considered. That is the humanitarian angle—the costs in hazards to the safety and the health of the workers. A piece of equipment may have low operating cost and be very efficient, but it may involve an unnecessary hazard on the part of all to have to use it. That results in just as big a dent in the ultimate profits of a producer, because a machine which costs the unnecessary death or loss of limb of an employe is just as obsolete as one that costs an unnecessary five thousand man-hours.

Of course, the producer will figure that he is *insured* against such losses. It is true that he is insured against the immediate outlay. But he pays it in the long run, both in cash and in conscience. Insurance companies do not pay for industry's losses out of their own pockets. They collect the funds from industry to pay for industry's losses—and they make a profit doing it.

John J. Porter, president of the North American Cement Corp. and chairman of the Portland Cement Association's Committee on Accident Prevention and Insurance, has said that accident reduction in the cement industry since 1920 has saved 12½ million dollars in compensation payments and medical costs. The insurance companies did not save it all, we may be sure, because the portland cement manufacturers are too keen business men not to have saved for the industry a large part of it in lower rates, or through self insurance.

It would be difficult, of course, to put one's fingers on all the factors that have gone into this industry's very remarkable accident prevention record. Quite justly Mr. Porter places great emphasis on the part played by the Portland Cement Association in making the industry safety conscious and providing safety education. At the same time we must take into account that the industry has gone through a mechanical revolution that has made every single piece of equipment in a cement plant far safer and more healthful to work around. Probably very few such replacements have been made specifically with cost-saving through accident prevention in view, yet many replacements could undoubtedly have been justified from that angle.

One might find many illustrations to bear out our argument. For example, starting in the quarry, present-day explosives, while perhaps no more efficient or cost-saving, are vastly more accident-saving. Therefore, to a wide-awake operator, the older types of explosives are obsolete. Plants used to be filled with open belts, rope and chain drives and open gears. Modern enclosed speed reducers, gearhead motors and enclosed chain drives are probably also more efficient and less costly in repairs, but their accident-saving features very likely outweigh all other elements of cost saving. Another manifest example is electrical equipment of all kinds; probably modern installations are not so notable for labor saving as for life saving.

Many old plants in the cement industry are said to be efficient in that they have low unit cost operations. They have low unit costs because all or nearly all the investment in them has been written off, and investment cost in the cement industry ordinarily is about as much as direct labor cost. But if those plants have not been or can not be made safe, healthful places to work in they are just as obsolete as a high unit cost plant. Perhaps we haven't yet reached a general realization of this factor, but with the ever increasing emphasis placed on labor relations and public relations, it is time we began to consider obsolescence from this humanitarian angle as well as from the direct cost-savings and efficiency angles. The savings from elimination of obsolescence are not all computed by arithmetic, for they involve evaluating such intangibles as the safety, health and goodwill of employes and the goodwill and sympathy of the public.

Nathan C. Rockwood

California's New Cement

To the left, in the background, is Cottrell precipitator building and concrete stack under construction. In foreground are hydro-separators; rear of the mill building; and on right, chemists' laboratory

CONSTRUCTION work on the new wet process cement plant of The Permanente Corp. at Permanente, Calif., is being pushed to an early completion to permit delivery on schedule of the largest cement order yet placed in this country.

The contract calls for 5,800,000 bbl. of low heat portland cement to be delivered at the Shasta damsite near Redding, Calif., starting March 1, 1940, and extending over a period of three years, with peaks of 295,000 bbl. for each of six months in 1941 and 195,000 bbl. in 1940. Construction of the cement mill, located about 12 miles northwest of San Jose and buried deep in the hill country of Santa Clara county, began June 23 shortly after the contract with the U. S. Bureau of Reclamation was signed.

Government engineers required that portland cement be aged in storage for a minimum of 30 days before delivery, which further narrowed down the available time for construction. Nevertheless, through efficient organization construction is on schedule, and officers of the corporation expect to make portland cement by November 1.

Available sources of limestone and clay at the site had been tested to the satisfaction of the technical staff long before the present contract had been awarded, and had been judged suitable for the manufacture of portland cement with present-day modern equipment.

The site is a "natural" with the principal quarry some 1100 ft. in elevation above the plant, utilizing gravity in the transportation of limestone and of clay, and having several small canyons for storage of the various partly-processed materials. Tremendous tonnages of soil and rock were removed ahead of construction, and the quarry is stripped and ready for excavation as soon as the mill is completed.

Unusual Features of Plant

Several features of the plant make it distinct from the average cement plant. It is somewhat unusual to provide 850,000 bbl. storage in cement and clinker in a new plant, but this is necessitated by peak demands which will at times exceed kiln capacity. After the big contract is fulfilled, this super capacity storage will afford what has been lacking in many plants—plenty of storage in separate units for various products and tested cements.

As the equipment had to be delivered on short notice, principal contracts for machinery were let according to the ability of manufacturers to meet a deadline. As a result, the heavy machinery contracts, consisting of two 12- x 450-ft. kilns and the grinding mills, preliminary and finish, were divided equally between the F. L. Smidth Co., New York, N. Y., and the Traylor Engineering Co., Allentown, Pa. Incidentally, the kilns will be the two longest in North America. Normally to be fired with gas, they will also be equipped for oil when other demands for gas are heavy.

Other outstanding features will be the extensive use of belt conveyors for transportation of materials, flotation for refining and chemically altering kiln slurry, and modern equipment for collecting dust wherever it may be generated.

To expedite construction, a number of sub-contracts were let, some to local California concerns and others to nationally-known organizations, in order that the various plant divisions will be completed when needed. The Permanente Corp. has set up a ready-mixed concrete plant near the railroad siding

One of three conveyor flights to carry stone from quarry downhill to cement mill

Plant Has Some Unusual Features

Wet process cement plant will have two of the longest kilns in North America and will utilize gravity for moving stone from quarry to large storage areas. Aggregates plant for Shasta dam will provide for an hourly production of 720 tons of gravel and 280 tons of sand.

By BROR NORDBERG

Plant model on exhibit at site. Contours show the extent to which gravity is used for conveying partly processed material to open storage. Above, left, are shown conveyors coming down from quarry on hill

for use by the various contractors. Plant design was worked up by the corporation under the supervision and direction of Henry J. Kaiser, Jr., project manager, and H. P. Davis, general superintendent of construction and chief designing engineer.

Construction Progress

In September, when the accompanying illustrations were obtained, 1200 men were on the payroll working in shifts, and every available place to live had been taken for miles around. The project has brought considerable financial benefit to Santa Clara county, and a town will eventually be established around the Permanente railroad station to accommodate cement mill workers.

At this writing, a two-mile railroad spur has been built from the mill to a Southern Pacific transfer line, and various mill divisions are well on their way up. The quarry has been developed and conveyors installed to transport materials to the plant; kilns have been set on their rollers; the mill building walls are nearing completion; the stack and stack dust collector building poured; a laboratory has been built; 27 cement silos have been erected simultaneously; and various slurry tanks are in place.

In addition to manufacturing "Santa Clara" portland cement, plants will be built for making road material and "sugar rock," and a 125-ft. rotary kiln lime plant is being constructed. Lime for steel fluxing purposes will be the principal outlet for the latter plant.

Crushing and Screening

Limestone is to be taken from a deposit, which will require comparatively very little blasting. The rock is in laminated layers from 1 to 16 in. thick, and when broken, is expected to furnish an ideal size for feed into a Traylor primary jaw crusher. Belt conveyors will carry stone from a 6-cu. yd. Bucyrus-Erie 120-B electric shovel to the crusher for reduction to 5 in. minus.

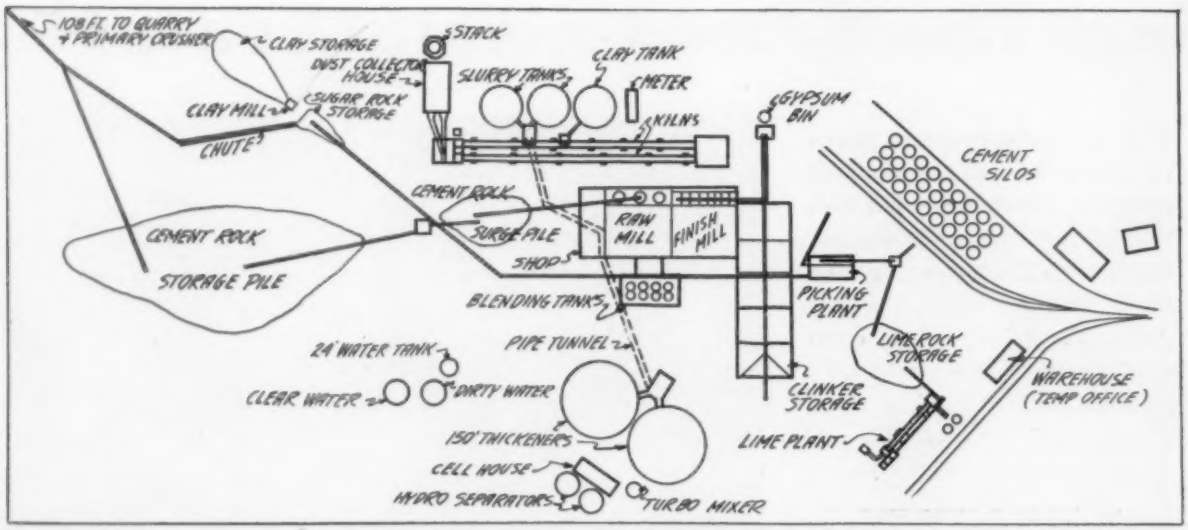
A series of three 36-in. belt conveyor flights totaling about 6200 ft. will transport the stone to two 4- x 10-ft. vibrating screens located at a drop-off into a canyon sloping toward the cement plant site. At this point a separation is made, 2½- to 5-in. stone being chuted to storage in one canyon and the 2½-in. minus stone, which is cement rock, to another. About 70 percent of all the stone will be stored as cement rock. Storage capacity available for this stone is about 600,000 tons.

For further reduction, a tunnel belt conveyor will reclaim limestone to a No. 49 Kennedy gyratory crusher and the product (¼ to ⅜ in.) is to be stocked in another surge pile to be reclaimed to the raw mill.

Clay is abundant throughout the region and pockets exist of varying composition to fit the needs of the low heat portland cement and various other cements to be manufactured when that contract is fulfilled. For that order a clay pit containing the approximate desired percentages of silica, alumina and iron for proper composition is to be opened. Clay is to be milled through a 9½- x 10-ft. Allis-Chalmers ball mill to about 60 mesh, the fineness of the limestone after grinding through one stage, and pumped into an 80-ft. diameter clay storage tank for later mixing with the limestone slurry.

As mentioned earlier the plant is a 2-unit design, with Traylor and

Showing 80-ft. slurry tanks under construction. One section of kiln ready for placement. Note kiln bearings in center foreground



General layout of the new cement plant being built by The Permanente Corp., in Santa Clara County, California

Smidth kilns and grinding mills for raw material and clinker, there being one complete setup of each type of equipment.

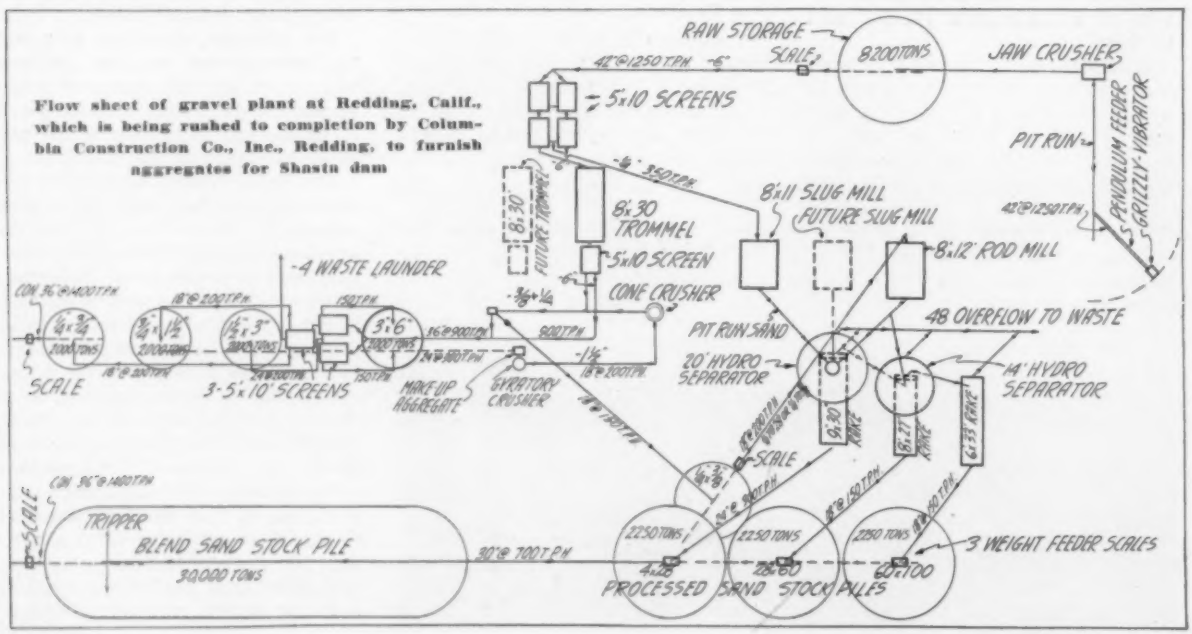
Limestone is to be ground in two stages. The preliminary reduction, to about 60-mesh, is to be accomplished through a 9½- x 10-ft. Traylor ball mill and also a 9- x 11½-ft. Smidth mill, preparatory to purifying the stone by flotation. The mills are to be closed-circuited with Dorr bowl classifiers. An excess of silica, in the form of chert, will be refined out of the limestone by 16 Separation Process Co. flotation cells. Clay is not to be similarly treated.

Corrected limestone slurry will then be passed into two 150-ft. Dorr hydro-separators, dewatered to about 30 percent moisture, and pumped into blending tanks. There are to be eight of these tanks, 22-ft. diameter by 40-ft., into which clay slurry is to be pumped and the contents air-agitated.

Second stage grinding, to about 93 percent minus 200-mesh, will be done through two 7- x 26-ft. tube mills, one by each manufacturer, in open circuit. Slurry pumps then are to transfer the fine product into two 80-ft. diameter Dorr agitating slurry tanks. A supply of slurry sufficient for seven days' kiln operation is being provided Raw mill capacity is rated at the kiln capacity of 10,000 bbl. of clinker daily, although it is expected that a 16-hr. run will be enough. There is some possibility that a third kiln will be installed at a later date and the plant is designed to accommodate this increase in capacity.

Both kilns are electric-welded, equipped with heat exchange chains of dissimilar design and have different types of coolers and methods of feeding the kilns. They are to be driven by Westinghouse direct current motors. A ferris wheel feeder will introduce slurry into the Traylor kiln and a scoop feeder into the Smidth kiln. The latter is a Unax kiln with cooler attached, to discharge to a Smidth skipulter while the clinker from the other is to be cooled through a 11½- x 120-ft. Traylor-Cheeseman rotary cooler. A common skipulter will convey clinker

Flow sheet of gravel plant at Redding, Calif., which is being rushed to completion by Columbia Construction Co., Inc., Redding, to furnish aggregates for Shasta dam



from both kilns to clinker storage. Both kilns are to be lined throughout their lengths, with 70 percent alumina block in the firing zone and Johns-Manville asbestos brick insulation in the calcining zone.

Finish Grinding

Before grinding the clinker and gypsum, it is to be reduced to ½- or ⅜-in. top size through two 3-ft. Traylor TY reduction crushers. Two distinct types of grinding, both simple circuits, are to be used. On the Traylor side, the preliminary grind will be in open-circuit through a 9½- x 10-ft. ball mill, followed by an 8- x 40-ft. three-compartment mill in closed-circuit with two Raymond mechanical air separators. The latter will be a simple circuit with the separators in parallel; rejects will be returned back into the first compartment and the fines are finished cement.

On the Smidth side, two three-compartment 8- x 36-ft. mills are to do all the grinding, each closed-circuited with a Smidth air separator. Here again, rejects will go all the way back. The arrangements, both simple, have about a balance in mill capacities theoretically, but are different and it will be interesting to observe their comparative performance after operation begins. Another difference is that Sylpebs grinding media in the Smidth system will be compared to steel balls used in the Traylor setup. Finished cement, ground to 1800 sq. cm. per gram for Shasta dam, will be pumped into concrete silos by a 6-in. Fuller-Kinyon pump (Traylor clinker) and a 7-in. pump (Smidth clinker). Capacity of the clinker grinding mills combined is rated at 8500 bbl. in 24 hr.

Clinker storage is to be 350,000 bbl. arranged in a series of bins to augment the finished cement storage and later to provide means to separate clinkers of different composition. Going into storage, clinker temperatures are expected to be less than 200 deg. F. Cement storage is 500,000 bbl in 27 concrete silos and 16 star bins.

Dust Collection Systems

Dust collectors are to be used wherever any appreciable dust is originated. Both kilns will exhaust through a 320,000 c.f.m. Western Precipitation Corp. Cottrell precipitator which is designed for a collection efficiency upwards of 98 percent. Cleaned air will exhaust through a 185-ft. Rust concrete stack, and eventually the plan is to utilize recovered dust as kiln feed material, probably in the form of slurry. Alkalis, according to tests, will be low.

Large Bucyrus-Erie electric shovel ready to be moved into quarry. It is now equipped with 4-cu. yd. bucket but later will have a 6-cu. yd. bucket

In the finish mill room, a Rees (Rees Blow Pipe Co., San Francisco, Calif.) bag-type filter will function with each side of the mill and another will collect dust from the clinker storage bins, kiln discharges, skipulters, clinker crushers, mill bins, etc.

Rust Engineering Co., Pittsburgh, Penn., had the contract to erect the stack and the concrete silos, all 27 of which were poured together, using slip forms. Bethlehem Steel Co. has the contract for steelwork in the mill building; General Electric Co. is furnishing all large synchronous motors; U. S. Motor Co., the small motors; W. S. Tyler Co., Cleveland, Ohio, all vibrating screens; Goodyear, the belting; Chain-Belt Co., conveyor idlers. Other manufacturers are participating in furnishing various other pieces of equipment, mostly undelivered.

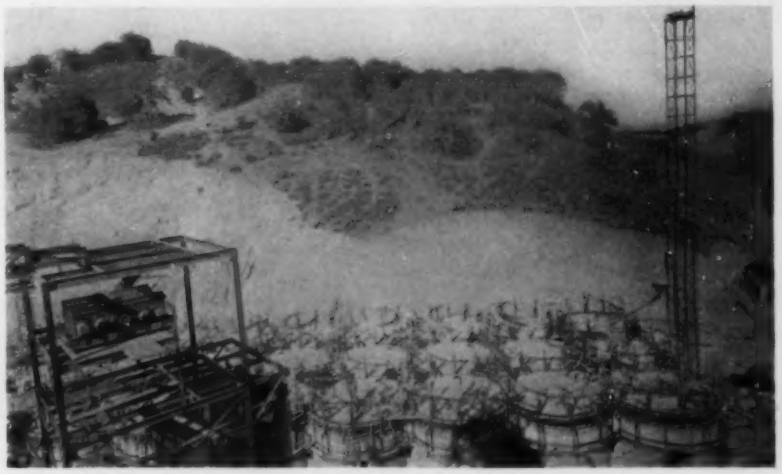
Aside from the cement plant, plus 2½-in. stone is to be used for sugar rock for sale to California's beet sugar industry. This stone will be selected over a picking belt to remove chert, which will be sold as road material from a separate screening plant. Finer chert removed by flotation will also be sold in order to use all by-products. Part of the limestone which has been picked free of impurities will be the feed for the rotary kiln lime plant yet to be built. Pack house facilities will be built in 1940. When completed, the cement plant will likely be one of the most economically-operated plants in the country.

Officers of the Company

Officers of The Permanente Corp., which was formed by a consolidation of other companies, are H. J. Kaiser, president; A. K. Humphries, vice-president; Charles Shea, treasurer; and H. J. Kaiser, Jr., secretary.

(Continued on page 36)

Twenty-seven concrete silos being built by slip-form construction. Total capacity, with interstice bins, will be 500,000 bbl. On left is auxiliary stone plant



COMMENTS ON THE NEWS

Sand and Gravel In "Talking House"

SO USED TO THINKING of sand and gravel in truck load and car load lots are we all, that it is possible many are overlooking the home-building market—the one big growing branch of the construction field. What brings this to mind is a news item in a Birmingham, Ala., newspaper to the effect that the Kirkpatrick Sand and Cement Co. is one of the sponsors of a "talking house," built and furnished by local business concerns for demonstration purposes. The Birmingham Slag Co. seems to have been a sponsor of another talking house. A talking house it seems is a furnished demonstration house provided with loud speakers and microphones, so that visitors are lectured by an unseen orator, and can ask questions and have them answered likewise.

The Kirkpatrick and Birmingham Slag companies, along with many other aggregate producers who have metropolitan distributing yards, sell sand and gravel for home building as ready-mixed concrete. Many other city producers who sell in small lots have devised dry mixes of cement, sand and gravel, or small separate batches, especially for the home builder, or home owner. The majority of home owners still need education on the advantages of clean and graded aggregates, and city producers should lose no opportunity to do their part. In total this business accounts for a good many million tons—and it should be profitable business.

Nipping Opposition!

THERE HAS BEEN a lot of agitation locally about the desirability of a cement plant in their midst—by the citizens of Los Altos, Calif. In fact an injunction suit has been filed by 290 residents to prevent construction of the plant. There is said to be a faint suspicion that the suit was inspired by more substantial citizens in other parts of California.

Anyhow, it is interesting to see how a resourceful go-getter (Henry J. Kaiser) is meeting this local opposition. His son, Henry J., Jr., superintendent, has issued an invitation to the public to come and take a look, so at least they will know what all the excitement is about. "Visiting hours" from 10 a. m. to 6 p. m. Sundays. Guides are supplied to escort visitors' cars "to a vantage point safely above the busy plant." How many operating cement plants are similarly cultivating local goodwill?

Did Some One Swipe A Mountain of Limestone?

ONE OF THE MOST CURIOUS civil suits ever heard of in the rock products industry is that reported in a California newspaper this summer.

The Henry Cowell Lime and Cement Co. is the plaintiff in a suit filed in Superior Court by the legal firm of Bronson, Bronson and McKinnon, of San Francisco, against the Pacific Portland Cement Co., asking judgment for a total in excess of $933,800.

The suit is filed in Eldorado county in that the issue relates to property northwest of Cool, near the American River.

The complaint charges that the defendant concern has entered upon the lands of the plaintiff and taken out limestone worth $445,000, and that such entry dates approximately from 1910 and was only discovered on February 15 of this year when the plaintiff company had its lands surveyed. Allegations of fraud in connection with the alleged entry also are made.

The prayer asks for an award of $1,200 a year for every year up to five years ago for the use of the plaintiff's property, for the $455,800 value of the limestone claimed taken out, and for $475,000 punitive damages.

LETTER TO THE EDITOR

Use of Cranes In Making Concrete Pipe

Dear Mr. Rockwood:

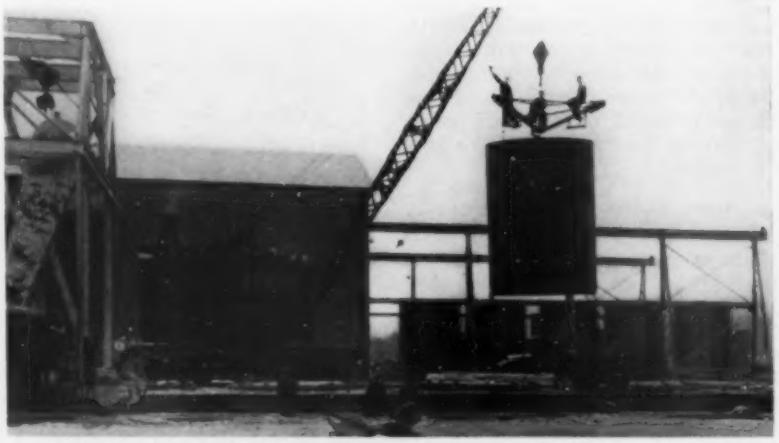
I read with interest your article in the September issue on the Lock Joint Pipe Co. plant at Natick, Mass. While I realize that your article deals primarily with the sand and gravel plant and the concrete mixing plant as the features of most interest to your readers, I do think that the method of pouring the pipe and their subsequent handling is so important that you should have given a little more detail. Locomotive cranes play a very important part in the manufacture of these pipes, and it seems to me your readers are entitled to know that all these cranes—and those in other Lock Joint Pipe Co. plants—are American Hoist & Derrick Co. design and manufacture.

These cranes are 25-ton cranes with booms of various types and lengths.

The cranes not only handle the buckets of concrete, as your article states, but of course are used to handle the steel shell, place and remove the forms, place and remove the canvas hoods, and transfer the pipe from storage to trucks for shipment. In very few operations in your industries do locomotive cranes play such an important role.

Yours very truly,

AMERICAN HOIST & DERRICK CO.
E. P. BROWN,
Advertising Manager.



Moving large concrete pipe forms with locomotive crane which also transports the pipe and buckets of concrete for pouring

Fig. 1: New crushing plant of the Kelley Run Stone Co., right foreground, and to the left of stock pile, construction view of new washing plant which is now completed

Make Many Sizes At Low Cost

New crushed stone plant designed to produce materials involving a wide variety of specifications with ample storage for any demand

By A. R. AMOS, JR.*

CONFRONTED with the problem of a rapidly diminishing source of available good stone at their old deposit, the Kelly Run Stone Co. decided early in 1938 not only to open a new quarry at a higher elevation on the South Mountain, but also to erect a complete new 125 to 150-ton per hour crushing plant as a part of the development. The selected location is about six miles southeast of Wilkes-Barre, Penn., where extensive prospecting had proved the existence of a large potential supply of a hard, tough sandstone suitable for use in all classes of construction and maintenance work.

Stripping Operations

The entire area, shown in Fig. 1, was rough and heavily wooded in its original state, requiring a large scale clearing and grading operation to establish a level surface for plant, stock pile space and buildings in addition to clearing and stripping the rock slope to permit starting the quarrying operation. This work was handled by a combination of power shovel and truck handling together with Caterpillar tractors and LeTourneau scrapers. In the case of the stripped rock, fine cleaning and removal of crevice and otherwise imbedded dirt was accomplished by hydraulic nozzle and fluming.

After stripping, development of a quarry face was pushed rapidly with wagon drills and jack hammers until sufficient height and length of face was obtained for well drill operation. Sometimes an operator gets a "break" and this was one case in point, as orders for large tonnages of rip rap stone for the Susquehanna River flood control dyke near Wilkes-Barre permitted a much more rapid quarry development than would have been possible on a basis of crushing all the rock quarried. An idea of the rapid progress can be obtained from the fact that the face as shown in the views represents only eight months' elapsed time from starting on the uncleared mountain side. Fig. 2 illustrates method of handling rip rap stone loading.

Plant design was based on the premise that the prime requisites for a modern plant of substantial capacity serving a well established comprehensive market, involving a variety of specifications, include: (1) Quality of product both as to grading and cleanliness. (2) Low operating cost, including good power consumption to stone output ratio, minimum manual attention and low maintenance cost with permanent, long life structures and heavy duty machinery units having a proved record of durability as well as efficiency. (3) Flexibility or ability to produce and place in live storage at the same time a wide number of various sizes in controlled proportions. (4) Provision of ample space and headroom for both present and possible future related operations, such as pile storage, washing, blending, bituminous or batching plants. (5) Obtaining an investment per ton of capacity ratio consistent with particular local conditions.

Primary Crushing

Rock loaded by steam shovel in the quarry is delivered by dump trucks to the feed hopper, Fig. 4, which is of sufficient capacity to hold several loads at one time, and from which it is fed to crusher by means of a 36 in. wide by 18 ft. centers heavy-duty, cast pan apron feeder. A push button control station on the operator's platform permits instant stoppage of feed to turn or sledge oversize rock, remove foreign matter and provide a uniform input to plant. The jaw crusher is a Farrell-Bacon Blake type, 36 x 42 in. opening, normally set to about six inches at discharge and equipped with a V-belt drive, which delivers its product to a 36-in. heavy duty belt con-

*Philadelphia representative, Smith Engineering Works.

Views of New Crushing Plant

Fig. 2: General view of quarry and material handling equipment. Fig. 3: Looking at plant from side, showing primary crusher unit at right, followed by scalping unit, secondary and finishing crusher stage, and at left, storage bin for finished sizes with sizing screens above. Fig. 4: Primary crusher unit, including dump hopper, pan feeder, crusher, overhead crane, primary conveyor and head end of return conveyor. Fig. 5: Gyratory secondary crusher. Fig. 6: Scalping screen, head end of primary conveyor, and scalping bin. Fig. 7: Finishing crushers with feed chutes from scalping bin, and re-crushing return conveyor from main bin. Medium reduction crusher on left and fine finishing crusher on right. Fig. 8: Opposite side of crushers, showing main elevator to sizing screens and chute from scalping screen

veyor by means of a grizzly chute designed to allow fines to drop through spaces and form a pad on belt to help absorb the pick up of the larger pieces. The motor sheave is grooved and the crusher pulley flat. Incorporation of an overhead traveling crane in a primary crusher structure is somewhat unusual, but it insures rapid, safe handling of all heavy parts and also is used to remove abnormally large rock which might block crusher opening.

Scalping and Secondary Crushing

From the jaw crusher the throughs are delivered by a 36-in. conveyor to a 72-in. by 25 ft. Telsmith roller bearing scalping screen, located above bin, as shown in Fig. 6. To insure clean stone ahead in the sizing stages of a plant, it is desirable to remove the maximum percentage of dirt at the scalper phase, and in this case a special 7 ft. blank section with A.R. steel liner plates and lifting angles was provided to tumble and churn the incoming rock. In this manner, dirt adhering to the larger rock pieces is scoured loose and removed through the ½ in. (square) dirt jacket along with the incoming loose dirt. The stone passing over the dirt jacket and minus 1½ in. (round) is removed by chute to a short 24 in. transfer conveyor feeding main elevator delivering to final sizing screen stage. Plus 1½ in. and minus 4 in. (round) is delivered to a bin compartment, where it is available as ballast product, or can be chuted to either of the finishing crushers. Plus 4 in. rock or tailings rejected over end of scalping screen is chuted direct to the 13-B Telsmith steel frame gyratory secondary crusher, with the product returned to the primary conveyor by a 24 in. belt, as shown in Fig. 5.

Returning the product of a secondary crusher back to the scalper instead of directly to final sizing plant will doubtless appear unorthodox, but it was so designed to produce either ballast or modified base course stone in the scalping bin, from which it can be trucked away directly, eliminating these large sizes from the elevator and sizing screens and allowing continued screening of the smaller sizes in the main plant without interruption or undue top deck loading. It also avoids truck congestion. The resulting large scalping bin also provides an excellent surge capacity for finishing crushers. The use of roller bearings in a rotary scalper is also not common, but their value in reducing starting torque and power consumption is indicated by the fact that this large screen can be turned empty by hand and power-check instrument tests showed within 10 b.h.p. consumed in operation. The gyratory reduces large pieces quickly in the upper crushing zone due to the parallel stroke, and it operates at an eccentric speed of approximately 220 r.p.m., combining to give a good capacity to horsepower ratio.

As will be noticed from Fig. 3, the scalping bin was located at a lower ground elevation than the primary crusher foundation, which is also true of main bin, to capitalize on the natural advantages of the side hill slope. The scalping bin holds 150 tons and is designed similar to the main bin. There are three compartments, each equipped with gate, and holding -½ in. waste, ½ in. to 1½ in. and 1½ in. to 4 in. respectively.

Finishing Crushing

Finishing crushers are a Traylor 12BH medium reduction gyratory, and a No. 36 Telsmith Gyrasphere spring relief fine crusher, the locations of which are shown in Figs. 7 and 8. These machines receive a sized feed from the scalping bin and deliver their product to a 24-in. transfer conveyor, 11 ft. 6 in. centers, which also receives the by-passed minus 1½ in. direct from scalper and delivers the combined load for the screening plant to the 24 in. by 54 ft. 6 in. main belt elevator, as shown in views Figs. 7 and 8.

Using an elevator instead of conveyors may seem out of step with present good practice, but was dictated by the necessity of keeping the main bin close coupled so as to be in alignment with the most desirable site for the future washing plant. Also, a relatively new unit with 12- x 15- x 24-in. buckets was available from the owner's old plant, and the resulting compactness afforded much more stockpiling area between the main bin and the highway. Particular care was exercised in designing feed and discharge chutes to limit spillage to a minimum. The No. 36 crusher, in addition to raw feed from scalping bin, also receives a feed of tailings and unwanted sizes from main bin surge pocket by means of a 16-in. return conveyor belt, as shown in Fig. 8. By varying the percentage fed to each of the finishing crushers and changing their discharge settings, it is practical to supply at any given time size proportions required to meet relative finished size capacities demanded in the main bin, and in combination with the duplex screen layout, provide excellent flexibility. At the same time, the multi-stage crushing with relatively small head diameters, results in a product enjoying good cubical characteristics.

Main Bin and Screens

The final sizing and live storage unit consists of a bin 56 ft. long by 17 ft. 6 in. wide, holding approximately 700 tons, and divided into seven equal compartments; a longitudinal partition in the center compartment provides a surge pocket for tailings and unwanted sizes for return to the No. 36 gyrasphere crusher by conveyor for re-crushing. The bin is of conventional timber design, but the supporting structure instead of employing pier walls, consists of concrete columns with bearing plates carrying continuous longitudinal girders on each side. Eye beams supporting the bin rest crosswise on these girders and in turn carry a continuous heavy angle to provide a bottom connection for all the vertical bin side stiffeners.

This construction has the advantage of eliminating space for moisture to lodge and cause deterioration of timber at connections; it also provides greatly increased visibility in area around bin gates and easy access in and out while loading trucks. An 18- x 18-in. radial type bin gate is installed at bottom of each of the seven bin compartments.

Above the bin is located a timber superstructure to carry head end of elevator and the vibrating screen units. There are four screens arranged in two independent units, one on each side of elevator with the elevator discharge divided so that one half of flow goes to each set of screens. In each unit the top deck of the upper screen removes the oversize which drops by chute to the tailings pocket in center compartment, while each bottom deck removes dust which drops to the dust storage in the balance of center compartment of bin. On each side the rest of the feed passes over the bottom deck of the upper screen and drops to the upper deck of the lower screen, where one size results from rejections of top deck, one size from throughs of top deck and rejections of the lower deck, and a third size from throughs of the bottom deck. Thus three sizes are delivered to the three main bin compartments on each side, or six possible sizes in all, and intermediate grading of various sizes is secured by mixing with controlled gates in the chutes. The screens are all of the positive eccentric type with sus-

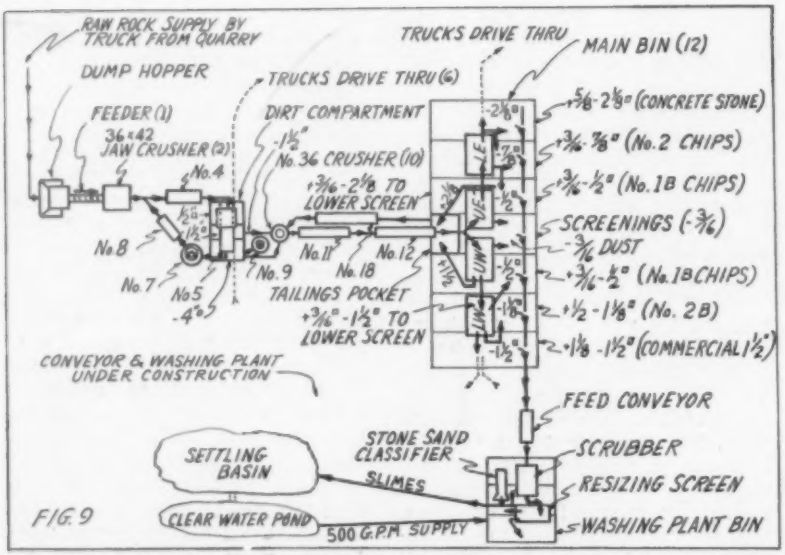


Fig. 9: Flow sheet of new Kelly Run Stone Co. plant. Note numerals which refer to tabulation of operations and equipment which appears below

pension mountings and driven by fully enclosed, fan cooled ball bearing motors through V-belt drives. A further idea of the flexibility of this screen layout may be gained by reference to the flow sheet in Fig. 9.

Power Facilities

Central station electric service was selected for source of power, and because the site is in an undeveloped area, it was necessary for the Pennsylvania Power and Light Co. to build a new transmission line for approximately three miles to the plant sub-station, where the primary voltage of 6900 is reduced to 440 volts 3 phase 60 cycle secondary by means of a bank of three 100 kv.-a. transformers. A 5 kv.-a. lighting transformer provides 110-volt, single-phase service for lights, small tools, etc. The main entrance switch is 800-amp. capacity, and the distribution panel provides circuits to four points: primary crusher unit, scalper and secondary crushers unit, main bin unit and shop and compressor house unit. These lines are carried on poles except in the case of the primary crusher unit, which was run under ground in conduit. Push button stations for remote control of individual motors are located at strategic points quickly reached by either the crushing or finishing plant attendant.

Power factor correction is obtained with 15 condenser units totaling 100 kv.-a. capacity installed on shelves in the sub-station and also from the 60-hp. synchronous motor on one compressor unit.

Total connected electric rated horsepower is 435 as compared with 125 to 150 tons per hour capacity on larger sizes, and 90 to 100 tons per hour on the finer sizes.

Washing Plant

A stone washing plant is now under construction, which may be seen in the left background of Fig. 1. This consists of a bin structure similar in design to the main sizing bin, except that on account of wet conditions, a steel framework and superstructure is provided to support washer, rinsing and re-sizing screen, and stone sand classifier. Feed to this plant will be by a long belt conveyor arranged to receive material through radial bottom gates from any one of the seven compartments of the main sizing and storage bin. Previously stock-piled material will be introduced by means of a vertical elevator serving a truck dump hopper.

A 7- x 9- x 9-ft. pump house of concrete block, in which is installed a 9-in. Goulds deep well pump with storage tank and pressure regulator, provides general water supply for office, jaw crusher bearing cooling system, and shop. This pump is driven by a 3 hp., 1800-r.p.m. motor through V-belts. Another concrete block building of the same size serves as the magazine for explosives. A 20- x 26-ft. block building shown in left foreground of general view provides the plant office facilities, with space for tests, record storage, etc., in the basement, and a 20-ton platform scale is located in adjacent pit. The concrete block structure beyond office building in Fig. 1 is a 32- x 84-ft. combination compressor house and shop building. The compressor section houses two single-cylinder 12 x 10 stationary air compressors, one driven by a 60 hp. synchronous motor with belted exciter, and the other by a 60 hp. Caterpillar power unit. The shop section includes a locomotive type truck pit, machinery and small tools for maintenance and repair of plant equipment. Stock piles are served with a Barber-Greene crawler—mounted bucket loader for rapid loading into trucks at minimum operating cost.

Design and construction of the new plant were under the personal supervision of B. C. Banks, general manager of the Kelly Run Stone Co., with the engineering coöperation of the writer.

		TABULATION OF OPERATIONS AND EQUIPMENT			
Operation	Key No.	Equipment Item	Make	Model No. or Size	Power Source
Drilling		Well drill (truck mounted) " " (crawler mounted) Compressor Compressor Wagon drill " " Jackhammers	Armstrong Cyclone Ingersoll-Rand Penna. Ingersoll-Rand " " " "	"33-WF #3101 XB-1, 12 x 10 12 x 10 Drifter H-75 " K-71	#60 Caterpillar unit 40 hp. 377 r.p.m. Synchronous motor with belted exciter
Loading		Power shovel " "	Osgood Marion	Heavy duty - 1½ cu. yd. bucket Type 7 - 1 cu. yd. bucket	Steam Steam
Transportation		Auto dump trucks (3)	Autocar and International	6 ton	
Primary Crushing	1 2 3 4	Cast pan apron feeder Primary jaw crusher Overhead crane Primary conveyor	Traylor Farrell-Bacon Reeper Stephens-Adamson	36"wide x 18'centers 20-B, 42" x 36" opening 6 ton 24" x 44'3" centers	10 hp. 1200 r.p.m. ac. 125 hp. 900 r.p.m. Manual Slipring motor 10 hp. 1200 r.p.m. ac.
Scalping	5 6	Rotary scalping screen Scalping bin	Telsmith Field	72" diam. x 25' long Timken roller bearing constructed - 150 ton capacity - 3 gates	20 hp. 1200 r.p.m. ac.
Secondary Crushing	7 8	Secondary crusher Secondary return conveyor	Telsmith Robbins	13-B steel frame gyratory 24" x 56' centers	50 hp. 1200 r.p.m. gr. 10 hp. 1200 r.p.m.
Finishing Crushing	9 10 11 12	Medium reduction crusher Fine reduction crusher Transfer conveyor Main elevator	Traylor Telsmith Telsmith Sprout-Waldron	#12BB gyratory #36 Gyrasphere 24" x 11'6" centers 24"x34'6" ctrs.,belt type	50 hp. 1200 r.p.m. gr. 50 hp. 1200 r.p.m. gr. Elevator foot shaft 30 hp. 1200 r.p.m. gr.
Sizing	13 14 15 16	East upper screen East lower screen West upper screen West lower screen	Niagara Niagara Telsmith Telsmith	4 x 10 double deck 3 x 8 double deck 4 x 10 double deck 4 x 10 double deck	5 hp. 1750 r.p.m. ac. 5 hp. 1750 r.p.m. ac. 7½ hp. 1750 r.p.m. ac. - enclosed "
Main Bin	17 18 19	Main bin Tailings return conveyor Bin gates	Field Telsmith Telsmith	constructed - 730 ton capacity - 7 gates 16" x 22' centers 10 x 10 Simplex type	2 hp.

Easy to Meet All Specifications With New Plant

Below steel storage bins is a long blending conveyor to facilitate making up specifications

By RALPH S. TORGERSON

WITH THE COMPLETION of its new sand and gravel plant at Bloomington, Ill., the McGrath Sand and Gravel Co., Lincoln, Ill., now has a large source of material strategically located to a good market. The deposit comprises nearly 100 acres with a depth of approximately 60 ft., representing about 50 percent sand and 50 percent gravel. This plant is served by five railroads; The Alton, Illinois Central, Big Four, Nickel Plate, and Illinois Terminal.

Stripping is done with a 12-cu. yd. Le Tourneau carryall scraper pulled by a Caterpillar RD8 Diesel-powered tractor.

Scalping and Crushing Unit

Excavation and transportation of material to the plant is by means of a Sauerman slackline cableway and 1½-cu. yd. Crescent bucket, operated by means of a 150-hp. Thomas hoist, which dumps into a steel sump having ample reserve capacity.

A dewatering elevator, 35-ft. centers, having perforated buckets, carries material from the sump to a chute leading to a 3- x 6-ft. Nordberg scalping screen, where all plus 2-in. stone is sent to an Allis-Chalmers No. 8 Superior-McCully gyratory crusher. The product of the crusher is recirculated back to the sump by a short 24-in. belt conveyor.

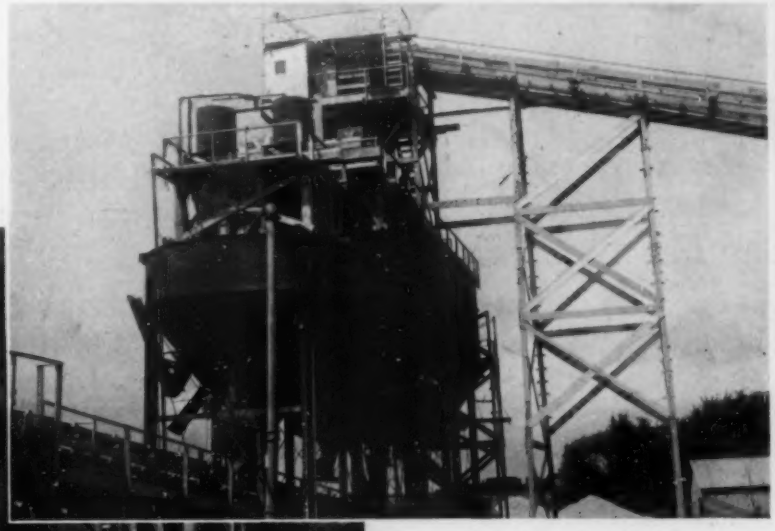
Conveyor Permits Flexibility in Meeting Specifications

Material passing through the scalping screen is elevated to the top of the sizing, storage, and blending plant over a 24-in. Link Belt conveyor, 300-ft. centers. This plant is at right angles to the belt conveyor from the scalping and crushing unit, and parallels a siding connecting with the Alton Railroad.

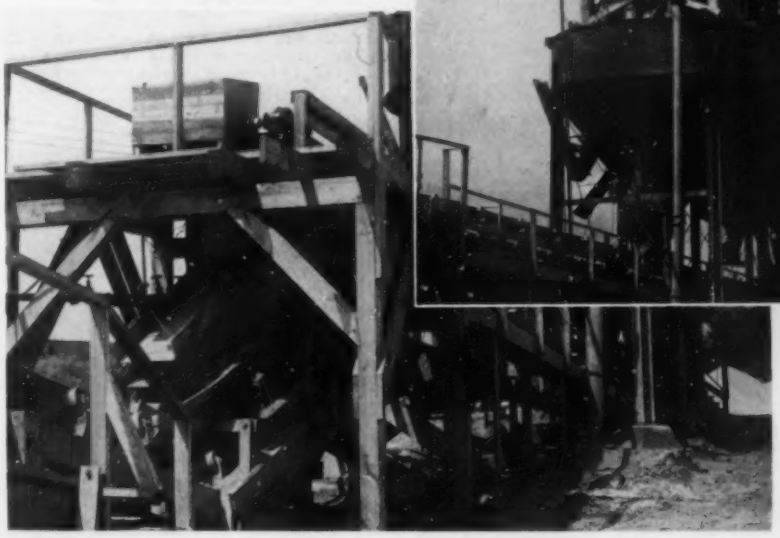
Located at the top of the plant over the four conical-shaped bins are the washing and sizing screens and two Shaw classifiers. All material from the long conveyor is chuted to a 4- x 8-ft. Simplicity triple-deck, vibrating screen. Throughs are then passed to two 3- x 6-ft. Simplicity double-deck screens in parallel where the sand is removed and chuted to two 30-in. Shaw classifiers. The screen mesh used in the three sizing screens is dependent upon the gradation of material desired. Wash water is provided by an 8-in. American Well Works pump from a creek fed by springs. Plant equipment also includes a ¼-cu. yd. Northwest crane for stockpiling and other yard work, and a 1½-cu. yd. Brownhoist locomotive crane which will be used for stocking material, loading cars from stockpiles, and switching cars.

Below the screens in line, are the four large steel storage bins having a total capacity of 17 carloads of sand and gravel. No. 1 bin below the Shaw classifiers holds two carloads of masons' sand, and three carloads of concrete sand. The next three bins each hold four carloads of gravel. No. 3 and 4 bins have steel partitions

Below: Four large steel storage bins with compartments for 17 cars of sand and gravel with sizing screens and sand classifiers above. Note long conveyor to the right from dewatering plant and reclaiming belt conveyor below bins



Left: Rinsing screen at the end of reclaiming belt conveyor feeds to loading out conveyor



Left: Dewatering plant, showing mast of slack line cableway excavator to the extreme left, gyratory crusher in center foreground, elevator and scalping screen above, and conveyor

General view of dewatering plant with slackline cableway excavator bucket in deposit, and long conveyor to screening and storage plant to the left. Building houses hoist

so that two different sizes of gravel may be stored in each. Gates are provided on each side in the cones of the bins to permit loading direct into railroad cars on one side or to trucks on the other side.

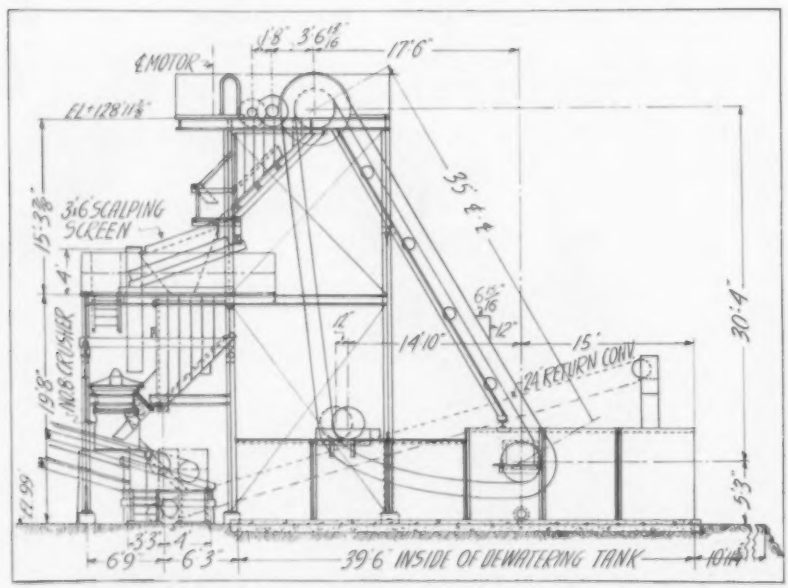
At the bottom of each bin is another gate which places material on a 30-in. reclaiming or blending conveyor, 125 ft. centers, supported on a timber trestle which is inclined upward to a hopper feeding a 3- x 6-ft. Simplicity rinsing screen, the screen cloth used being dependent on the gradation of materials being blended at the time.

From the rinsing screen a 30-in. belt conveyor, approximately 50 ft. centers, elevates the blended aggregate to a hopper for loading out railway cars. Trackage has been provided to permit storage of 40 cars. All cars loaded out will be weighed by the railroad company and a modern Columbia track scale has been installed for weighing trucks. The capacity of the plant under full production will be between 1500 and 2000 cu. yd. per day.

High tension power is purchased from the local utility company and stepped down by a transformer station at the plant to 440 volts, the voltage used by all motors. There is approximately 350 hp. in electric motors. The plant was designed by W. H. K. Bennett, Chicago, whose company also furnished the steel bins.

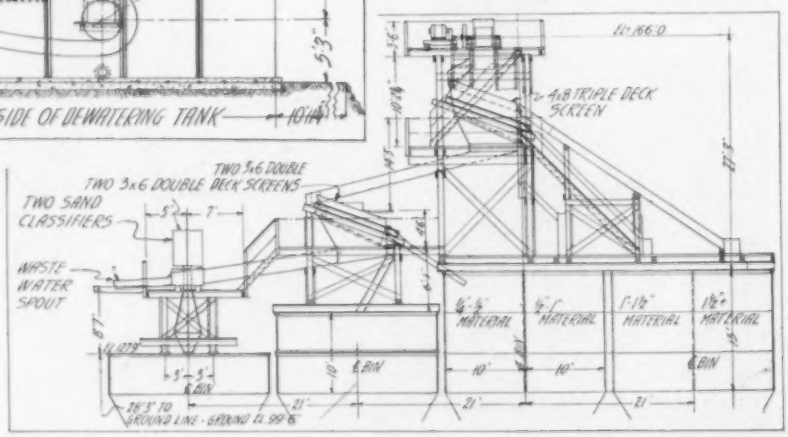
Four Other Plants

In addition to the new Bloomington, Ill., plant, the McGrath Sand and Gravel Co. operates four other plants at Chillicothe, Forreston, Oakhill, and Pekin, Ill. Officers include: J. W. McGrath, president; T. E McGrath, vice-president, and Tom P McGrath, secretary-treasurer. The new Bloomington plant was built under the supervision of R. H. Ashley and his assistant, C. H. Larson. Mr. Ashley has general supervision of both the Pekin and Bloomington plants. Mr. Larson is superintendent at Bloomington.



Above: Details of dewatering plant, showing relative location of scalping screen, elevator, material storage sump, and crusher for oversize

Below: Screening plant and storage bin layout, showing how materials are blended to meet any specification on the reclaiming conveyor below bins



REMOTE CONTROL For Gypsum Calcining Kettles

All operations on calcining floor and firing floor of gas fired kettles are controlled from panel on calcining floor, above

By R. O. KLOTZ

PRACTICALLY all of the older mills still calcine gypsum by the batch process in upright cylindrical kettles. Many of them are now gas-fired, where low cost of gas permits. The use of gas under the kettles instead of coal permits excellent control of the heat. However, it does not eliminate the necessity of keeping a man on the firing floor to regulate the gas burners and the settings of the stack dampers according to signals from the calciner on the floor above. Needless to state, the job of the fireman with a gas-fired installation is extremely simple.

One company having such equipment has eliminated the fireman's job, has placed all controls for the kettles on the calcining floor, and has given the calciner full responsibility for the proper firing of the kettles and for the quality of the products produced in them.

The diagrams show how this was accomplished:

Valves were placed vertically in the supply pipes to the burners. These were opened and closed by means of a 1½-in. pipe extending horizontally to a worm gear and then another pipe, at about a 45-deg. angle extending to the control board on the calcining floor. The worm gears were from the steering columns of old Buick motor cars of about 1925 vintage and were obtained from a junk yard for one dollar each. A minor adjustment on these gears made them turn the gas valves sufficiently to open them for the maximum amount of gas needed at the burners. Hand wheels were mounted on the control board to adjust the gas pressure. Pressure gauges on the control board were connected by ¼-in. pipe to the gas supply line just above the burners.

Exact setting of the dampers was made possible at the control board through wires from the damper arms extending over small pulleys to the control board. There the wires were attached to threaded rods worked

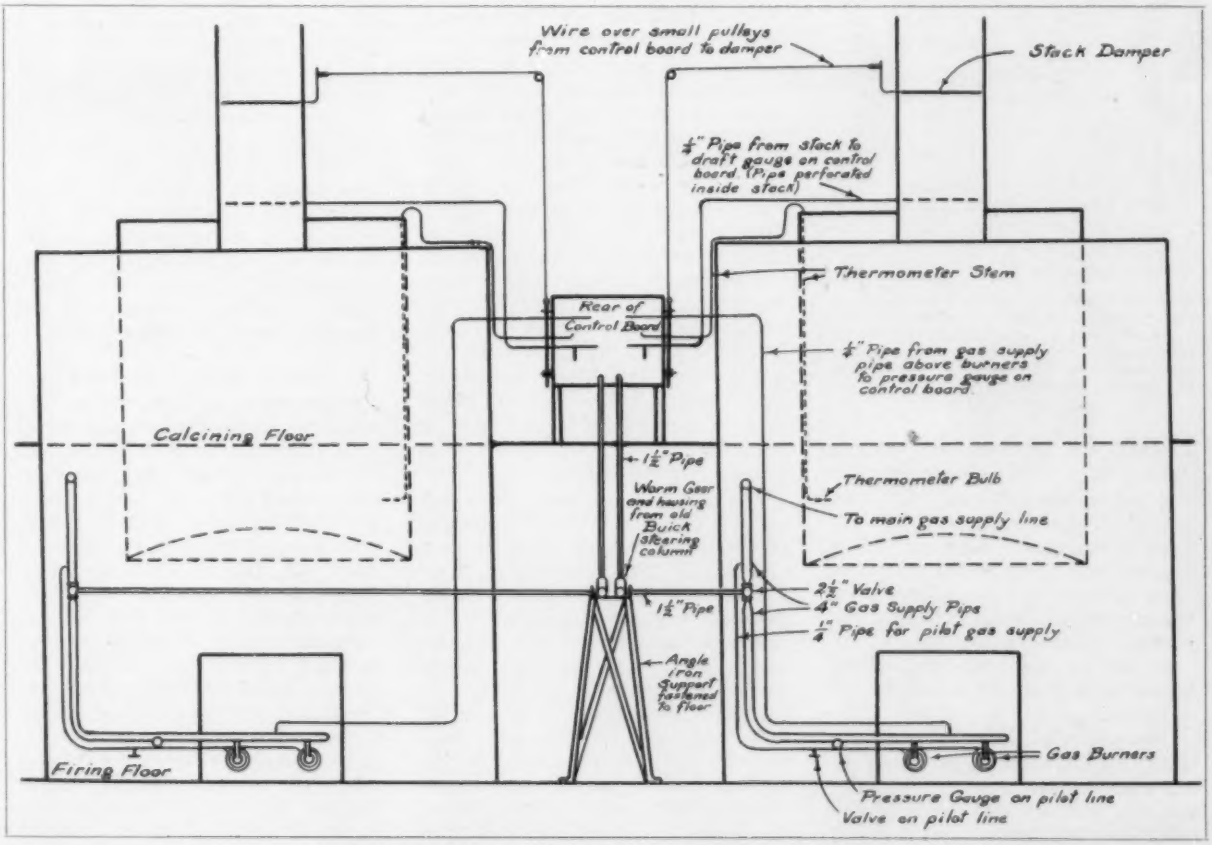

Wire over small pulleys from control board to damper
Stack Damper
¼" Pipe from stack to draft gauge on control board (Pipe perforated inside stack)
Thermometer Stem
Rear of Control Board
¼" Pipe from gas supply pipe above burners to pressure gauge on control board
Calcining Floor
1½" Pipe
Worm Gear and housing from old Buick steering column
Thermometer Bulb
To main gas supply line
2½" Valve
4" Gas Supply Pipe
1½" Pipe
¼" Pipe for pilot gas supply
Angle iron support fastened to floor
Gas Burners
Firing Floor
Pressure Gauge on pilot line
Valve on pilot line

Fig. 1: Layout of a pair of gypsum calcining kettles operated from a central control board

up and down by small hand wheels, as shown by F on Diagram 2.

Dry draft gauges were mounted on the control board and were connected to the kettle stacks by ¼-in. pipe, perforated at regular intervals inside the stack. These pipes were tapped back of the control board and connections with stop-cocks were provided on the face of the board for the rubber sampling tube of a gas analyzer outfit.

Recording thermometers were placed on the control board as shown. In order to reduce vibration on these and on the draft gauges, the control board was anchored to each kettle with tie-rods and the two posts at the base were cushioned at the floor. A control board about 4 ft. wide and 3 ft. high was ample for this equipment.

With the use of a flue-gas analyzer it was a simple matter to determine, by trial and error method, the draft setting which gave the best results

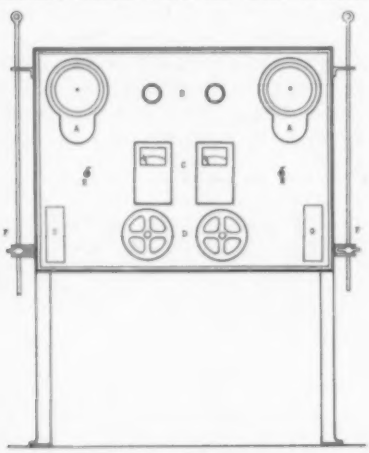


Fig. 2: Control board. A—recording thermometer, B—gas preasure gauges, C—draft gauges, D—hand wheels for gas regulation, E—connection for flue gas analyzer, F—damper regulators, G—charts showing proper draft for each gas pressure

at each gas pressure. An analysis showing 10 to 11% of carbon dioxide and no carbon monoxide was considered excellent. After the draft settings were determined for each kettle and for each gas pressure, charts of these settings were made and were mounted on the control board for the guidance of the calciner.

As can be seen, separate control boards were necessary for each pair of kettles.

This centralization of control eliminated the fireman's job on each shift. The calciners had much quicker control than formerly and were well satisfied with the arrangement. The only times that the calciners were required to go to the firing floor were in starting up, when it was necessary to light the pilots, and in closing down, when the pilots had to be turned off.

By closer control of the draft it was found that an appreciable saving in fuel was obtained, amounting to about 100 cu. ft. of gas per ton of gypsum calcined. Naturally, better control always tends to result in closer uniformity in the product produced and this was found to be so.

Thus, by a few comparatively inexpensive changes and the installation of a few instruments, considerable savings resulted in labor and fuel costs and the quality of the product was improved.

Shasta Dam Aggregates Plant

(Continued from page 27)

Much of the design work was done by W. C. Stevenson, cement plant engineer, who has had wide experience in cement mill operation and design. C. M. Price, formerly with Northwestern States Portland Cement Co., Mason City, Iowa, has been appointed chief chemist.

Shasta dam is being constructed by the U. S. Bureau of Reclamation as part of the great Central Valley project and will be the second largest concrete dam in the world. The general contract for the dam, to be built on the Sacramento River near Redding, Calif., has been awarded to Pacific Constructors, Inc., a syndicate of companies operating in all sections of the United States.

Columbia Construction Co., Inc., Redding, has been awarded the contract for aggregates, representing 7,600,000 tons of gravel in four sizes and 2,800,000 tons of sand. To complete this contract, the company is now constructing a modern aggregates plant of 1000 tons hourly capacity near Redding and about 12 miles from the damsite. Construction started in August and production is slated to begin December 1. Harry Davis, general superintendent of construction for The Permanente Corp. cement mill, is project manager for the Redding plant and S. J. Davis is general superintendent in charge of construction.

The flowsheet on page 26 serves to illustrate the general similarity of the proposed plant to those previously built for Grand Coulee, Bonneville and Boulder dams. Some stripping is required in the pit, which had been worked years ago, and the water level is 10 ft. below grade line, necessitating draglines for excavation. Monighan draglines of 5- and 7-cu. yd. capacity will feed material to a pendulum conveyor similar in design to that used at the Radum, Calif., plant of the Kaiser Paving Co. Discharge will be into the hopper end of the conveyor and the feed controlled by vibratory feeder.

Pit run material will be reduced to 6-in. minus through a 42- x 36-in. Farrel-Bacon jaw crusher and placed in storage of 8200 tons live capacity. Details of the flow are readily followed in the flow sheet, but certain units of equipment are new because of deposit conditions. The deposit naturally contains the proper proportions of sand and gravel for an hourly production of 720 tons of gravel and 280 tons of sand except for a disintegrated rock coating on the gravel and sand. The blade mill (see flow sheet), an 8- x 30-ft. Joshua Hendy Iron Works, Sunnyvale, Calif., machine, is for the purpose of removing this material from the gravel. The slug mill, an 8- x 11-ft. Allis-Chalmers machine, is to perform the same operation on sand. The slug mill principle of operation is one of differential grinding to prevent breaking up good sand. Loss in tonnage, passed off as slimes, is to be replenished, to maintain the original balance, by grinding up new sand from ⅜- to ¼-in. gravel at an expected rate of 100 tons per hour. The rod mill is an 8- x 12-ft. Marcy machine, manufactured by Mine and Smelter Supply Co., Denver, Colo.

Three Grades of Sand

Three grades of sand will be produced, to be re-blended and stored in a single stockpile of 30,000 tons live capacity. Three Dorr classifiers will produce the sand. The products produced by each, and maximum tonnages, are indicated on the flowsheet, all minus 100-mesh being wasted. Screens are furnished by the W. S. Tyler Co., the cone crusher indicated is a No. 4 Symons and the gyratory crusher is a Traylor 3TY crusher. Merrick "feedoweights" and "weightometers" will be used to proportion material and record total flows respectively at locations indicated on diagram. Delivery to the damsite will be in gondola cars. F. W. Crocker, engineer, designed the plant.

How Much Does It Cost?

Part 2. Simple but comprehensive accounting system used by this large producer covers time and payroll records, forms for recording sales, and daily reports of production

By KELSEY D. HOWINGTON*

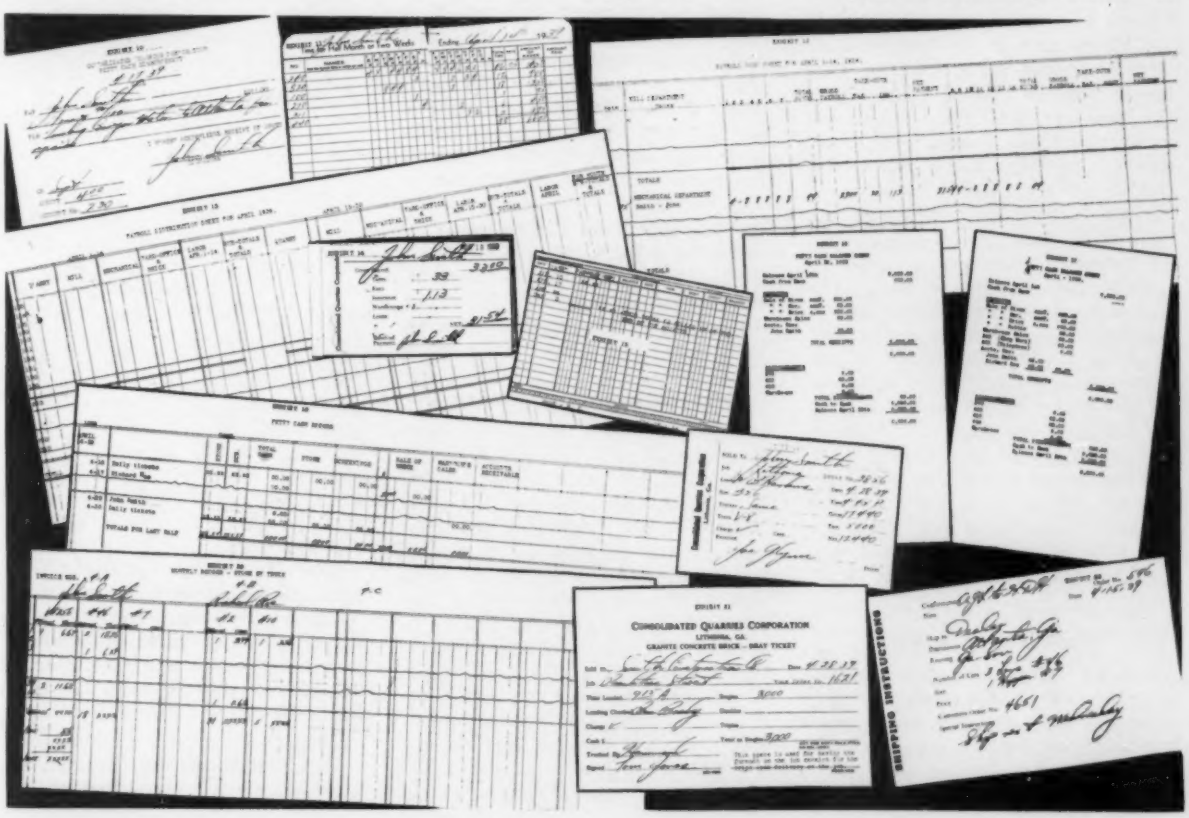
IT MIGHT be well to note here that any payments made from petty cash are covered by a signed disbursement receipt as per exhibit 10 and at the end of the period these are compiled for the balance sheet which will be discussed later. They are then posted in the essentials material column of the material work sheet as shown in exhibit 5, discussed in Part I. (ROCK PRODUCTS, Sept., p. 25.)

When a new employe is hired he is required to fill in an employment record which gives his full name, date of birth, last job and why that employment terminated, social security number, etc. The superintendent then adds the rate of pay and this gives the plant office complete data for placing his name on the payroll. An alphabetical card index is made up covering each employe showing his name, date employed, social security number, rate of pay and any change in this rate with date, date employment terminated and the reason therefor. Current cards are kept in an active file and cards covering all former employes are kept in a closed file which gives the plant office a ready reference on former employes.

The employe is sent to the correct foreman for work and his name added to the time book for that department. A two-week form time book is made up for each department as shown by exhibit 11, and the foreman of that department marks up the time daily for the employes in his department, showing the account number on which the work was performed in the extreme left hand column and the number of hours worked on that account for the respective days under the different dates. These time books are turned in at the plant office daily and the time posted daily to a payroll work sheet as shown by exhibit 12. The men are paid four times each month, payment for the first seven days of the month being on the 10th; for the second seven days, on the 17th; third seven days, on the 24th, and the balance of the month, on the 3rd of the following month. The first two periods are run on the same payroll sheet, and at the end of the first two periods the time books covering those periods are extended as shown in exhibit 11.

Charges to each account number are then consolidated from the time books and posted to a payroll distribution sheet, as shown by exhibit 13; totals for each department on this distribution sheet must check

*Assistant Treasurer, Consolidated Quarries Corp., Lithonia, Ga. Mr. Howington has been with the company since 1928, and acquired the degrees of L.L.B. and C.P.A. in his spare time.



with the total for that department for the two periods shown on the payroll work sheet. This same process is then repeated with new books and new work sheets covering the last two periods of the month, the figures being consolidated on the distribution sheet giving the total labor charges to each account for the entire month. Totals are then posted to labor cost sheets, the same forms previously shown by exhibits 8 and 9. The cents per ton cost is then run the same as discussed on material items.

Method of Handling Payrolls

Payrolls are handled in cash since the plant is some distance from the nearest town, and it is thus more convenient to the employe. The payroll envelopes used have a carbonized detachable slip pasted to the front of the envelope which allows the receipt slip and the envelope to be filled in at the same time, as shown by exhibit 14. These envelopes are made up each period from the payroll work sheet, and then added and checked to see that the net cash total shown by the envelopes equals the total figure shown by the payroll work sheet. Each employe must sign for his own payroll, and the receipt slips are turned back at the pay window. These slips are then used for posting figures to a social security cardex system as shown by exhibit 15. These payroll receipts give us signed receipts for all money paid out in payrolls and, of course, both the envelope and the receipt are dated with a date stamp showing the date the payment was made. At the end of each quarter, the social security cardex cards are added and this gives us the data for the social security quarterly reports.

Petty cash is balanced out at the end of each one-half month and a balance sheet issued as per exhibit 16, then at the end of the month these two are consolidated into one for the entire month as per exhibit 17. Daily figures are posted on a petty cash record as per exhibit 18 and the papers supporting these entries are kept on a separate file until the end of the period when they are filed with this petty cash record and the balance sheet covering that period.

Cash Stone Sales

A large item in this daily income in petty cash is the cash sales of stone and brick by truck. Each truck load of stone leaving the plant is weighed by our loading man and signed for by the driver of the truck on a dray ticket, as per exhibit 19. These tickets are turned in each day at the plant office where they are checked and posted on the petty cash record. The driver of the truck signing each ticket gives a check against any errors by the loading man, and the loading man witnesses the entry in the petty cash record at the plant office each day as a check against any error there. The same dray tickets are used for both cash and credit sales, but the credit tickets are posted to a monthly record of credit sales by truck as shown by exhibit 20. This credit record is posted daily until the end of the month when it is totaled, priced and extensions made at the bottom under the name of each customer. The invoice numbers can then be placed at the top over each customer's name and this sheet used to make out the monthly or weekly invoices (whichever system is used).

Cash Brick Sales

Another large item in petty cash is the cash sales of brick. The brick foreman checks each load of brick leaving and makes out a brick dray ticket, as per exhibit 21 and shows thereon the amount of cash received or if it is a charge sale he indicates this in the space provided for the purpose. The cash tickets are then posted on the petty cash record as shown by exhibit 18 and the copy covering the sale turned in at the plant office is filed with the other cash tickets as discussed above. Credit tickets are made out in triplicate; one copy is for the driver of the truck, one copy is then priced and mailed to the customer as an invoice, and the original copy is posted to a brick sales record book. Having the brick foreman make an additional copy eliminates the necessity of typing any invoices covering brick sales.

Accounting for Shipments

When an order is received by either the main or plant office a shipping instruction, as shown by exhibit 22, is made in duplicate and the time received noted thereon. A duplicate copy of this shipping instruction is sent to the other office in the daily mail. If the main office receives the order, the shipping instruction is telephoned to the plant office in order to speed shipment. The plant office, on all orders received whether from the main office or the customer, makes out a telephone shipping instruction in duplicate, as shown by exhibit 23, the original copy of which is immediately turned over to the loading man.

Bills of Lading

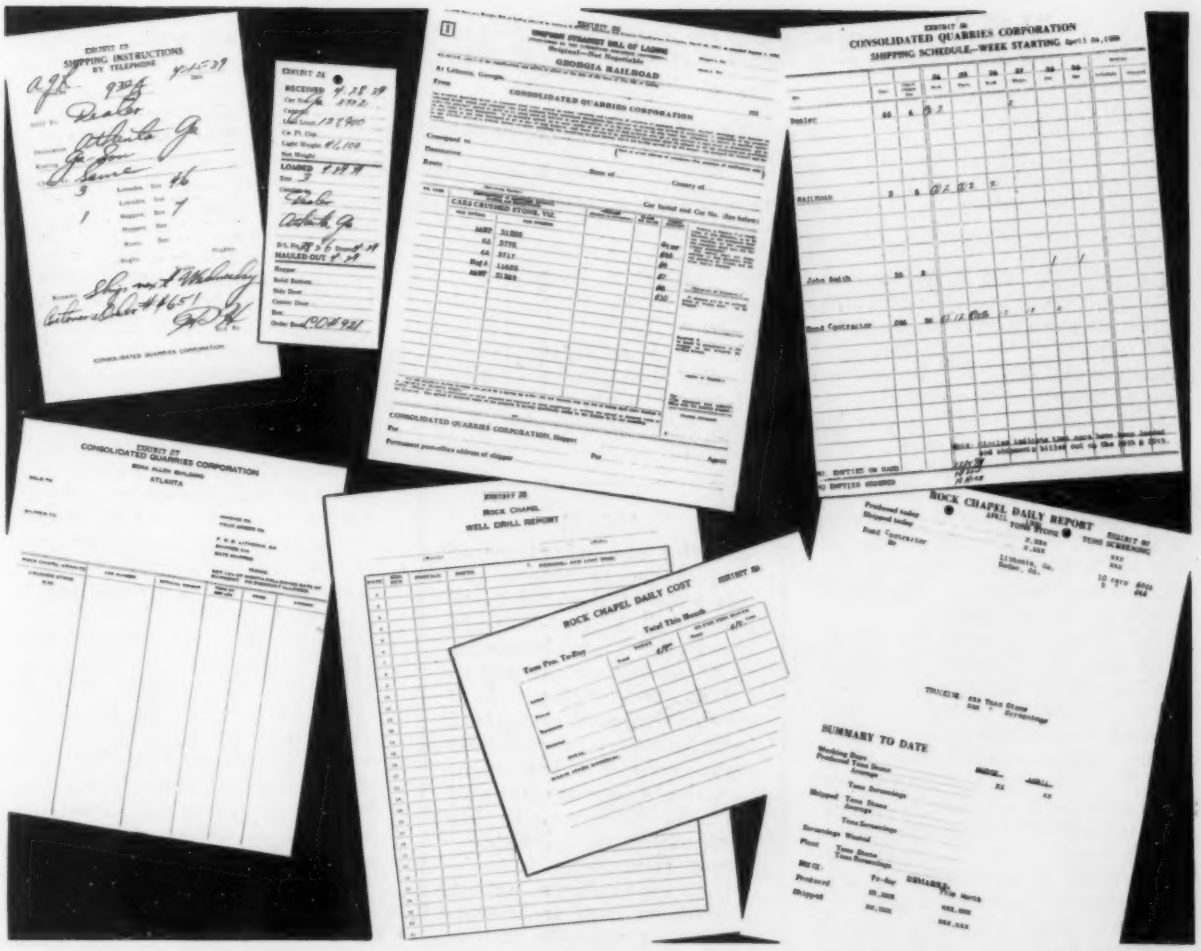
This gives the loading man written authority for his day's loading. Upon receipt of an empty car a car card, as shown by exhibit 24, is made out covering that car showing the date received. After the loading man has finished loading a car according to his written instructions, he fills in the size and date loaded on the correct card and turns all of these cards covering loaded cars over to the plant office.

A bill of lading is then filled out covering the cars on a form which has space for as many as 15 cars to be entered on the same bill of lading to the same customer, as shown by exhibit 25. The number of the bill is noted on the car card and the fact noted on a weekly shipping schedule, as shown by exhibit 26, which form has been filled in when the order was first received. This weekly shipping schedule gives a check on shipments scheduled for future shipments and also gives a check against errors of oversight or lost instructions. A postal notification card is made up from the bills of lading and mailed to the customer which gives him notice of the car numbers and sizes shipped that day.

Invoices

After the bills of lading have been signed by the railroad agent, an invoice is then drawn up and mailed to the customer along with the original bill of lading. The form used in invoicing is shown by exhibit 27 and one such invoice is made for each bill of lading with the same number used as on the bill. In addition to being posted to the accounts receivable, these invoices are also posted to a sales record book showing the number tons of stone and screenings and the value of each separately; the same handling as has been shown for cash truck sales. At the end of the month, the totals from the sales record book, after both credit and cash truck sales records have been added, give the total tons of each sold during the month and their values. It will be well to note that the management has considered any size below $\frac{3}{8}$-in. as screenings. You will note the handling of this in the monthly report forms which will show you the reason for keeping these tonnages separate.

WELL DRILLING: This completes the explanation of the source of all figures used in the preparation of re-



ports except for the tonnage drilled figure on the review of operations report. A report is turned in at the end of each month by the well drill operators as shown by exhibit 28. With this report in hand the tonnage drilled can be computed from the cubic footage, using the depth and spacing of the drill holes.

DAILY PRODUCTION: At the end of each day's operation, the mill foreman reports the number of trucks dumped in the primary crusher, where the count is made each day, from which the tonnage produced for that day is compiled.

ACCOUNTS RECEIVABLE: Very few items of accounts receivable are handled at the plant office for all accounts are payable at the main office.

POWER: It will be noticed that there is only one account for power or electricity used, account No. 350. The management decided that it would be of more value to have this item in one account rather than have it distributed proportionately to the different accounts using electricity.

TAXES, INSURANCE AND DEPRECIATION: Taxes, insurance and depreciation are all handled on the general books at the main office as overhead and are not charged into plant costs on the operating statements issued at the plant office, except for the item of Workmen's Compensation Insurance which is charged into plant costs in account No. 405.

SUPERINTENDANCE: The cost of superintendance is all charged into plant cost account No. 400 and is not distributed to various accounts.

Daily Reports

DAILY COST REPORT: After the material tickets and time books have been posted each day a daily cost sheet is made up as shown by exhibit 29. The labor figure is quickly obtained by having a total figure just below each department, showing the amount of the total for that department if each man in that department worked the total shift. Putting this figure in the adding machine, any extra hours or the amount covering any shorter shift can be easily added or subtracted by looking down the list of the payroll work sheet for that day. The power figure is estimated at the start of each month, and this figure used until the correct amount is learned and then the daily amounts can be adjusted for the balance of the month. The dynamite figure is obtained by using the cents per ton which is being used at that time. The method of obtaining this has already been explained. The material figure is obtained from the material work sheet, taking that day's total. Any major items of material, amounting to over $50, are noted at the bottom of the report. This daily cost report keeps the management informed day by day on the costs of operation.

DAILY PRODUCTION REPORT: A daily report of the production and shipments is made up as shown by exhibit 30. It can readily be seen how these figures are obtained by the discussions on the cash and credit truck sales, trucks dumped in the primary crusher, and the weights on rail shipments. This gives the management a daily picture, comparing this month with the previous month, on daily production and sales.

(To be continued)

Mineralizers In Cement

Results of recent investigations on the use of mineralizers in the manufacture of portland cement

By E. P. FLINT*

As early as 1882 it was known[1] that the addition of certain materials, such as fluorspar, to the portland cement raw mix facilitates clinkering and accelerates the rate of silicate formation. The properties of cements prepared from clinkers to which small amounts of fluorspar and barium carbonate had been added before heating were investigated at the National Bureau of Standards in 1914-18[2]. Further studies[3] showed that the presence of fluorspar markedly reduced the uncombined lime content of various cement mixtures heated between 1300 and 1450 deg. C. Bates and Klein[4] studied the effect of adding small amounts of various oxides to mixtures having the compositions of dicalcium and tricalcium silicates before heating, and Flint and Wells[5] described the effect of boric oxide on the formation of calcium silicates. The present paper reports a continuation of this program and includes a comparison of the mineralizing activities of magnesium fluosilicate, calcium fluoride, calcium phosphate, boric oxide, and cryolite. The results are presented at this time because of the very interesting effects obtained with magnesium fluosilicate. The investigation of the fluosilicate mineralizer is being continued. Clinkers having a greater range of composition are being prepared in sufficient quantities for determinations of strengths and other physical properties of the resulting cements. It was not believed desirable, however, to withhold this report pending accumulation of the long-time strength data.

The raw materials used in the present investigation were calcium carbonate, granular silica gel, ferric oxide, aluminum oxide, magnesium fluosilicate hexahydrate, calcium fluoride, calcium phosphate, boric acid, and cryolite. The silica gel was a commercial product labeled "prepared sand" and was purified by treatment with hot concentrated nitric acid, followed by thorough washing with distilled water. It had a purity of 99.86 percent on an ignition-loss free basis. Analysis of the calcium carbonate showed 55.93 percent CaO (theoretical for $CaCO_3$ = 56.04 percent CaO). The other compounds were all of usual "C. P." quality, and appropriate corrections for impurities and ignition losses were applied in preparing the mixtures.

NOTE

In the manufacture of portland cement, a raw mix which will give 8 to 10 percent of $Al_2O_3+Fe_2O_3$ in the clinker is usually chosen, as these two oxides act as fluxes and bring about clinkering and complete combination of the cement compounds at temperatures available in commercial practice. However, in the preparation of sulphate-resistant cements it is desirable to have as low a content of alumina and iron compounds as possible. If the proportion of the fluxing oxides is to be reduced to about 3 percent for this purpose, then a mineralizer or catalyst must be found that will be as effective in promoting the formation of silicates as the 5 to 7 percent of $Al_2O_3+Fe_2O_3$ which has been left out of the raw mix.

—THE AUTHOR

Preparing Test Mixtures

In making up the experimental mixtures the above raw materials in the calculated proportions were weighed out into dry bottles. The mixtures were then shaken thoroughly, placed in platinum crucibles and heated for one-half hour over a Méker blast burner to drive off moisture and CO_2. The products were ground in an agate mortar and stored in well-stoppered bottles.

Heat treatments were all made in a platinum-wound resistance furnace of the Roberts type[6]. Temperatures were measured by a platinum-platinum rhodium thermocouple in conjunction with a precision potentiometer and galvanometer. The thermocouple junction was inserted alongside the charges, which were contained in small platinum thimbles capable of holding 1.5-g. samples. The thimbles were so designed that two of them could be placed simultaneously in the furnace side by side. In most experiments both thimbles contained the same base mixture, with the mineralizer present in one sample and absent in the other. By this means it is believed that an excellent measure of the effect of the mineralizer was obtained. The heating period in all experiments was 1 hour.

Results of Experiments

Table 1 summarizes the results of experiments in which the mineralizer used was magnesium fluosilicate (added as the hexahydrate, 1 percent $MgSiF_6$ = 1.6 percent $MgSiF_6.6H_2O$). In experiments 1-7 the base mixture (column 2) contained CaO and SiO_2 in the proportion to give a 50 percent $3CaO.SiO_2$-50 percent $2CaO.SiO_2$ mixture on complete combination of the oxides; in experiments 8-10 a tricalcium silicate mixture was used. The amounts of R_2O_3 added are given in column 3 and, unless otherwise designated, consisted of equal parts of ferric oxide and alumina (e. g., 2 percent R_2O_3 = 1 percent Fe_2O_3 + 1 percent Al_2O_3). Column 4 gives the amounts of magnesium fluosilicate added. In column 5 are given the percentages of $3CaO.SiO_2$ and $2CaO.SiO_2$, calculated according to the Bogue method[7], which can be formed from the base mixtures. The calculations include the changes in the potential compound compositions of the base mixtures, in terms of $3CaO.SiO_2$ and $2CaO.SiO_2$, necessitated by the presence of R_2O_3. However, it was assumed that no such changes resulted from additions of 1-2 percent of magnesium fluosilicate. Columns 6, 7 and 8 of the table give the observed compound compositions

*National Bureau of Standards, Washington, D. C.

of the products heated for 1 hour at 1350, 1400 and 1450 deg. C. The amounts of $3CaO.SiO_2$, β—, and γ-$2CaO.SiO_2$ were determined by inspection of the powdered samples under the petrographic microscope and no great accuracy is claimed for the values given. It is believed, however, that they represent the compound distributions closely enough for the purpose of the investigation. The free CaO was determined by the ammonium acetate titration method[8], and consequently these values are more accurate than those determined microscopically. No attempt was made to identify such minor constituents as glass, $3CaO.Al_2O_3$, $4CaO.Al_2O_3.Fe_2O_3$, $2CaO.Fe_2O_3$, or fluoride compounds. The sum of these constituted 10 percent or less of the total in all cases.

The most striking feature shown by table 1 is the great reduction in uncombined lime effected by the presence of 1 percent $MgSiF_6$. In experiments 1-5, the percentages of free lime were more than 10 times as great, with one exception, in mixtures to which no fluosilicate was added. The increases in tricalcium silicate content, ranging between 5 and 35 percent, effected by the fluosilicate additions are equally noteworthy, and the trend toward higher β- and lower γ-dicalcium silicate contents in the mixtures containing fluosilicate is also evident in the table.

Experiment No. 4 indicates that 3 percent R_2O_3 with 1 percent $MgSiF_6$ is sufficient to bring about almost complete combination in a 2.5CaO:SiO_2 mix at 1350-1450 deg. C, but not to prevent partial β-γ inversion of dicalcium silicate except at 1450 deg. C. In normal cement compositions this inversion may be inhibited largely by the liquid content of the clinker, which solidifies to a glass before the β-γ inversion temperature is reached. The temperature of liquid formation in the base mixtures plus R_2O_3 of experiments 1-4 is 1338 deg. C[9], so that liquid was present at the temperatures of heating, but only in small amount owing to the low content of the fluxing oxides.

The results obtained in experiment 5 are remarkable in that more complete combination of lime was obtained with this mixture, which contained no Fe_2O_3, than in experiment 4, where both Fe_2O_3 and Al_2O_3 were present. As the temperature of liquid formation in the system $CaO-Al_2O_3-SiO_2$ is 1455 deg. C[10], the reactions at 1350 and 1400 deg. C must have taken place in the presence of an extremely small quantity of liquid. The activity of the fluosilicate in this Fe_2O_3-free composition indicates a possible use of $MgSiF_6$ in the manufacture of white portland cement.

TABLE 1.—EFFECT OF $MgSiF_6$ ON FORMATION OF CALCIUM SILICATES

Exp. No.	Base Mixture	R_2O_3 Content	$MgSiF_6$ Content	Calculated Composition as Silicates	Observed Compositions of Products Obtained by Heating 1 hr. at		
		%	%	*	1350°C.	1400°C.	1450°C.
1.	2.5CaO:SiO_2	2	0	40.6%C_3S 55.4%C_2S	0%C_3S 10%β-C_2S 50%γ-C_2S 30.0%CaO	0%C_3S 10%β-C_2S 70%γ-C_2S 15.3%CaO	5%C_3S 20%β-C_2S 60%γ-C_2S 9.2%CaO
2.	2.5CaO:SiO_2	2	1	40.1%C_3S 54.9%C_2S	30%C_3S 10%β-C_2S 50%γ-C_2S 3.6%CaO	30%C_3S 20%β-C_2S 40%γ-C_2S 1.25%CaO	40%C_3S 30%β-C_2S 20%γ-C_2S 0.6%CaO
3.	2.5CaO:SiO_2	3	0	36.1%C_3S 57.9%C_2S	0%C_3S 10%β-C_2S 60%γ-C_2S 19.1%CaO	0%C_3S 30%β-C_2S 50%γ-C_2S 14.9%CaO	20%C_3S 20%β-C_2S 50%γ-C_2S 5.6%CaO
4.	2.5CaO:SiO_2	3	1	35.5%C_3S 57.5%C_2S	30%C_3S 10%β-C_2S 50%γ-C_2S 1.2%CaO	30%C_3S 20%β-C_2S 40%γ-C_2S 0.5%CaO	35%C_3S 50%β-C_2S 5%γ-C_2S 0.2%CaO
5.	2.5CaO:SiO_2	3%Al_2O_3 0%Fe_2O_3	1	27.5%C_3S 63.5%C_2S	25%C_3S 10%β-C_2S 60%γ-C_2S 0.3%CaO	25%C_3S 30%β-C_2S 40%γ-C_2S 0.0%CaO	25%C_3S 60%β-C_2S 5%γ-C_2S 0.0%CaO
6.	2.5CaO:SiO_2	1.5%Al_2O_3 0.0%Fe_2O_3	1	38.3%C_3S 56.7%C_2S	.....	20%C_3S 30%β-C_2S 40%γ-C_2S 3.9%CaO	30%C_3S 20%β-C_2S 40%γ-C_2S 1.9%CaO
7.	2.5CaO:SiO_2	1.5%Fe_2O_3 0.0%Al_2O_3	1	44.1%C_3S 52.3%C_2S	.....	30%C_3S 20%β-C_2S 40%γ-C_2S 3.8%CaO	30%C_3S 20%β-C_2S 40%γ-C_2S 2.0%CaO
8.	3CaO:SiO_2	3	0	84.5%C_3S 9.5%C_2S	.....	20%C_3S 35%β-C_2S 20%γ-C_2S 17.6%CaO	40%C_3S 20%β-C_2S 20%γ-C_2S 11.9%CaO
9.	3CaO:SiO_2	3	2	82.6%C_3S 9.4%C_2S	.....	70%C_3S 10%β-C_2S 10%γ-C_2S 3.2%CaO	80%C_3S 10%β-C_2S 0%γ-C_2S 2.2%CaO
10.	3CaO:SiO_2	3%Al_2O_3 0%Fe_2O_3	1	75.5%C_3S 15.5%C_2S	40%C_3S 20%β-C_2S 20%γ-C_2S 7.8%CaO	50%C_3S 30%β-C_2S 10%γ-C_2S 6.0%CaO	60%C_3S 25%β-C_2S 5%γ-C_2S 3.2%CaO

* C_3S = $3CaO.SiO_2$; C_2S = $2CaO.SiO_2$.

Experiments 6 and 7 show that Fe_2O_3 and Al_2O_3 behave similarly when added separately in small amounts to a 2.5CaO:SiO_2 mixture. The free lime and silicate contents of products containing either oxide were practically identical.

The addition of 2 percent $MgSiF_6$ to a tricalcium silicate base mixture reduced the uncombined lime at 1400 and 1450 deg. C to about one-fifth of the amount found in the samples in which no $MgSiF_6$ was present, as shown in experiments 8 and 9. The tricalcium silicate content was raised by 40 and 50 percent by the addition of the fluosilicate. Experiment 10 gives the results of heating a 3CaO:SiO_2 composition containing only Al_2O_3.

Table 2 lists the results of heat treatments on dicalcium and tricalcium silicate base mixtures to which calcium fluoride, boric oxide, phosphorus pentoxide, and sodium aluminum fluoride (cryolite) were added. For better comparison the mixtures were made up to contain 1 percent of fluoride (= 2.0 percent CaF_2), 1 percent B_2O_3 (= 1.8 percent H_3BO_3), 1 percent P_2O_5 (= 2.2 percent $Ca_3(PO_4)_2$), and 1 percent Na_3AlF_6. As before, R_2O_3 was equally distributed between Fe_2O_3 and Al_2O_3. All heat treatments were for 1 hour at 1450 deg C.

Calcium fluoride reduced the uncombined lime in both dicalcium and tricalcium silicate mixtures. It increased the γ- at the expense of the β-$2CaO.SiO_2$, and increased the $3CaO.SiO_2$ by 20-30 percent. A comparison of the activities of calcium fluoride and magnesium fluosilicate on a tricalcium silicate mixture heated at 1450 deg. C is given by experiment No. 9, table 1 and No. 24, table 2. When 2 percent of $MgSiF_6$ was added to the base mixture instead of 2 percent of CaF_2, the $3CaO.SiO_2$ content increased from 60 to 80 percent, the β-$2CaO.SiO_2$ increased from 5 to 10 percent, the γ-$2CaO.SiO_2$ decreased from 20 to 0 percent, and the uncombined lime decreased from 4.7 to 2.2 percent. It is evident that the fluosilicate is by far the more active mineralizer.

Boric oxide completely prevented the β-γ dicalcium silicate inversion, and hence is advantageous in pre-

paring β-$2CaO.SiO_2$ in the presence of 0 and 3 percent R_2O_3, as shown in table 2. However, a tricalcium silicate mixture containing 3 percent R_2O_3 and 1 percent B_2O_3 (No. 25) showed more uncombined lime after heating than a mixture to which no B_2O_3 was added. This agrees with the results of a previous investigation[5], where it was found that the "addition of boric oxide to ternary mixtures of CaO, SiO_2 and Al_2O_3, with or without the addition of Fe_2O_3 and MgO, inhibited combination."

Phosphate behaved somewhat similarly to boric oxide as a mineralizer in that its presence increased the free lime content of three mixtures (Nos. 14, 22 and 26) out of 4, over that where no phosphate was added. No particularly beneficial effect of P_2O_5 in reducing the β-γ inversion of $2CaO.SiO_2$ was noted, except possibly in experiment 26.

Experiments 27 and 28 involved two tricalcium silicate mixtures to which 1 percent of a pure sample of natural cryolite was added. Comparison of the results of these experiments with those of Nos. 20 and 24 indicates that Na_3AlF_6 is probably somewhat more effective as a mineralizer than CaF_2.

Summary of Results

In summing up the results of these experiments it is evident that boric oxide and the phosphate can be eliminated from consideration at once, as their addition to the cement mixtures is at best not beneficial, and is probably detrimental. The effect of cryolite was not thoroughly studied because of the limited natural supply of this mineral, which, moreover, is needed in other manufacturing processes. The use of cryolite as a flux in the manufacture of white portland cement has, however, been mentioned in the literature.[11]

The advantages and disadvantages of adding calcium fluoride to portland cement raw mixtures have recently been pointed out by Eitel[12] in a study of the system CaO-CaF_2-$2CaO.SiO_2$. On the one hand, Eitel found that the addition of calcium fluoride was beneficial in promoting the formation of tricalcium silicate and lowering the clinkering temperature of the mix by as much as 200 deg. C; on the other hand, that the presence of calcium fluoride accelerated the decomposition of tricalcium silicate below 1250 deg. C and greatly increased the tendency of β-dicalcium silicate to invert to the γ-form. For these reasons it was emphasized that, in the use of fluorspar additions in clinker heating, care must be taken that cooling below 1250 deg. be made as rapid as possible.

Nagai[13] in a study of the effects of various fluorides on the thermal synthesis of calcium silicates at 1100-1300 deg. C, found that magnesium fluosilicate was less effective than calcium fluoride in promoting combination of lime and silica. The results obtained in the present study, however, are in better agreement with the theory of Eitel[12] that the activity of fluorides in promoting silicate formation is due to the presence of SiF_4-groups, which enter into exchange equilibrium with, and activate the SiO_4-groups, thereby facilitating combination of the latter with basic constituents, such as CaO. Since magnesium fluosilicate loses SiF_4 on ignition, leaving a residue of MgF_2, the activity of the fluosilicate is probably due to the presence in the mix of both dissociation products. A part of the SiF_4 may be lost by volatilization, but it is be-

(Continued on page 52)

TABLE 2. EFFECT OF CaF_2, B_2O_3, P_2O_5, AND Na_3AlF_6 ON FORMATION OF CALCIUM SILICATES

Exp. No.	Base Mixture	R_2O_3 Content	Mineralizer Added	Calculated Composition as Silicates	Observed Composition of Products Obtained by Heating 1 hr. at 1450°C.
11.	$2CaO:SiO_2$	0	None	100%C_2S*	20%β-C_2S 80%γ-C_2S 1.4%CaO
12.	$2CaO:SiO_2$	0	2%CaF_2	98%C_2S	10%β-C_2S 90%γ-C_2S 0.0%CaO
13.	$2CaO:SiO_2$	0	1%B_2O_3	99%C_2S	Practically Pure β-C_2S 0.3%CaO
14.	$2CaO:SiO_2$	0	1%P_2O_5	97.8%C_2S	10%β-C_2S 80%γ-C_2S 5.0%CaO
15.	$2CaO:SiO_2$	3	None	92.4%C_2S 1.6%C_2S_3	70%β-C_2S 20%γ-C_2S 0.2%CaO
16.	$2CaO:SiO_2$	3	2%CaF_2	90.6%C_2S 1.5%C_2S_3	50%β-C_2S 40%γ-C_2S 0.0%CaO
17.	$2CaO:SiO_2$	3	1%B_2O_3	91.5%C_2S 1.6%C_2S_3	90%β-C_2S 0.0%CaO
18.	$2CaO:SiO_2$	3	1%P_2O_5	90.4%C_2S 1.5%C_2S_3	50%β-C_2S 40%γ-C_2S 0.0%CaO
19.	$3CaO:SiO_2$	0	None	100%C_2S	10%C_2S 35%β-C_2S 30%γ-C_2S 20.9%CaO
20.	$3CaO:SiO_2$	0	2%CaF_2	98%C_2S	40%C_2S 5%β-C_2S 40%γ-C_2S 11.6%CaO
21.	$3CaO:SiO_2$	0	1%B_2O_3	99%C_2S	10%C_2S 70%β-C_2S 21.5%CaO
22.	$3CaO:SiO_2$	0	1%P_2O_5	97.8%C_2S	0%C_2S 10%β-C_2S 60%γ-C_2S 25.4%CaO
23.	$3CaO:SiO_2$	3	None	84.5%C_2S 9.5%C_2S	40%C_2S 20%β-C_2S 20%γ-C_2S 11.9%CaO
24.	$3CaO:SiO_2$	3	2%CaF_2	82.8%C_2S 9.3%C_2S	60%C_2S 5%β-C_2S 20%γ-C_2S 4.7%CaO
25.	$3CaO:SiO_2$	3	1%B_2O_3	83.7%C_2S 9.4%C_2S	30%C_2S 50%β-C_2S 14.8%CaO
26.	$3CaO:SiO_2$	3	1%P_2O_5	82.6S 9.3%C_2S	40%C_2S 40%β-C_2S 0%γ-C_2S 12.8%CaO
27.	$3CaO:SiO_2$	0	1%Na_3AlF_6	99%C_2S	60%C_2S 20%β-C_2S 10%γ-C_2S 8.6%CaO
28.	$3CaO:SiO_2$	3	1%Na_3AlF_6	83.7%C_2S 9.4%C_2S	60%C_2 S 25%β-C_2S 0%γ-C_2S 5.8%CaO

* C_2S = $2CaO.SiO_2$; C_3S = $3CaO.SiO_2$; C_2S_3 = $3CaO.2SiO_2$

Washing—Classifying Sand

Part 6.—Applications of the classification laws and principles and the types of equipment required for most efficient operation

By EDMUND SHAW

CLASSIFICATION is the separation of granular materials into sized products by utilizing differences in the velocity with which large and small grains settle in a fluid. The fluid may be a liquid or a gas. Water is universally the medium except for those materials which are too much affected by it. For these oil is sometimes substituted. Air is the only gas used, so far as the writer knows, in air classification, or air separation, as it is commonly called.

Classification when it is used as a laboratory method, as for soil analysis, is often called elutriation, and the device for using it that way is called an elutriator. In old books one sometimes finds these terms applied to classification on a plant scale.

The laws governing settling, or the fall of grains in water, have been discussed in previous articles. This article will deal with their application.

Classifiers have been made in many forms, and the old books on ore dressing have many illustrations of classifiers that were long ago forgotten but were highly thought of in their time. Today only a few forms are in wide employment. The use of electric power has made it possible to have a power driven device placed almost anywhere in the plant, so the mechanical types of classifiers have grown in favor. When power had to be transmitted by belts and ropes the hydraulic types of classifier were preferred.

But the art of classification is not dead, and it has decidedly grown in importance in the rock products industries since specifications for concrete sand have grown stricter in regard to grading. There are not many new devices since the writer wrote the pamphlet which was published by ROCK PRODUCTS in 1929, but there is one decided innovation: classifiers that use the centrifugal force of whirling currents to effect a separation. At least two classifiers of this type have been on the market long enough to make certain that they have commercial application.

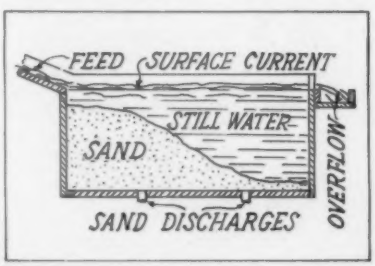


Fig. 1: Simple form of surface current classifier

Types of Classifiers

Classifiers are either "free settling" or "hindered settling," and by far the greater part of those used in the rock products industry belong to the free settling types. This term means that the grains are sufficiently separated as they fall so that they do not particularly affect one another in falling. In hindered settling the grains are purposely made to fall through a crowded mass of grains teetering in water. The difference may be seen quickly by taking the specific gravity of the mixtures of water and sand in both types with a hydrometer. The specific gravity in the free settling classifier will be 1.05 to 1.10; in the hindered settling classifier it will be 1.50 to 1.55, both handling silicious sands. The laws of settling discussed in the preceding chapter apply only to free settling grains.

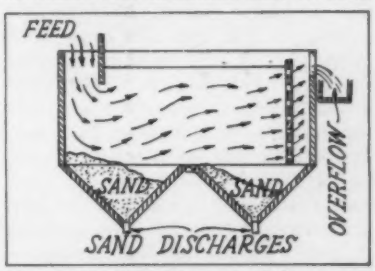


Fig. 2: Obsolete form of whole current classifier. It was efficient but took up too much room

The free settling classifiers may be divided into surface current and rising current classifiers. (The whirling current classifiers may be classed with the rising current classifiers, since they lift the fine grains with a current.) The surface current classifier is the simplest. It is a long box through which the stream carrying the grains flows, but only as a current on the surface. The speed with which the current flows is regulated by the dimensions of the box, and these are chosen so that grains of the desired size will settle in the box while the lighter grains go into the overflow.

In the whole current classifier the flow is a great deal slower because this flow is through the entire box instead of only on the surface. One way of insuring this is to put a perforated partition in the end of the box. Owing to its slow current, this type was much favored at one time for recovering fine sands, but the development of classifiers of the bowl and thickener types has made it obsolete. These latter really belong to the rising current classifiers, being a development of the cone with a center feed and a circular overflow.

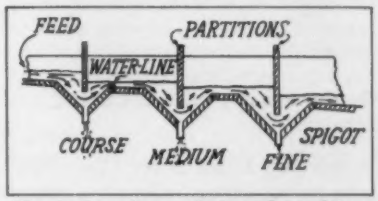


Fig. 3: Launder pockets and partitions, crude but efficient, make three sizes of sand. Regulation is by changing size of spigot and position of partitions

The rising current classifier type is the kind that includes most of those in use. One of the oldest forms is a pocket in a launder with a sliding partition to send the current down. It is still somewhat in use, and it is not a bad form to use in sand plants, where the separation does not have to be so close as it does in some other works. The double-cone classifier is one of the best known of the older classifiers. The rising current was between the inner and the outer cones, and the angle of the inner cone was made steeper so that changing its position would narrow or open the channel between the cones, according to whether the inner cone was moved downward or upward. Large cones are in use as classifiers, which have center feed and an overflow around the periphery. They are not made adjustable except by putting in a ring that will reduce

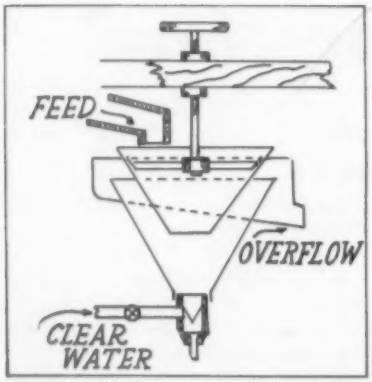


Fig. 4: Double cone classifier, formerly much used

the area of the part through which the current must rise.

But the most typical rising current classifier is the "spitzlutte." Sometimes the inner V-sectioned filler is made adjustable to increase and decrease the cross section of the channel through which the current rises, thus increasing and decreasing its velocity.

Removing Sand from Classifier

Of the classifiers which use a mechanism for removing the settled sand, the drag belt is probably the oldest, so it is chosen as a type of these machines. It is difficult to class them according to the flow of the classifying current, because the disturbance of the rakes or drags plays an important part. The form shown here at (*a*) is definitely a rising current classifier, the feed going in behind the partition and rising through the body of the classifier to an overflow on the side. This type has been used a great deal as a closed-circuit classifier with tube mills. Only a few of the drags found in the rock products industry are fed that way. The usual place to put in the feed is at about the center of the machine, or toward the discharge end, and the overflow is at the end opposite the sand discharge. The movement of the drags keeps the fine grains from settling and thus gives the effect of a rising current. Once at the top, the grains flow to the overflow at the rear end. This form is shown at (*b*).

In both these classifiers the separation may be varied by raising and lowering the height of the overflow. With a lower overflow the disturbance by the drags is greater and the area of the pool of water is less. Both these effects tend to put more fine sand in the overflow and less in the sand discharge. The same effects may be had by raising the sand discharge end. If the drags are large enough to handle the load at a slower rate, the speed of the drags may be used to change the separation.

Clear water to complete the classification may be applied to almost any kind of classifier, but hydraulic water is best applied to the cone types. Taggert says that these are the best for making a series of products because the rising current water keeps the clayey and very fine matter out of the discharges. Without the clear water the voids in the sand will hold a lot of such material, as was explained in the article on washing. In the mechanical types of classifiers the clear water is usually applied in sprays which play on the sand as it is pulled out on the drain board.

A few types of classifiers using hydraulic water, old and new, are shown. All such classifiers make two classifications, a rough separation by

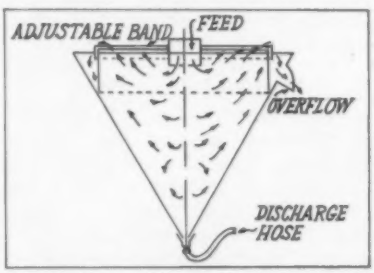


Fig. 5: Large rising-current cone, much used for fine sand, with adjustable overflow lip

the current of the feed water and a finished separation by the action of the hydraulic water. Modern machines of this type are made with large settling areas and mechanical means for bringing the settled sand to the discharge, and they are very successful in saving clean fine sand.

Hindered settling classifiers have had great success in ore dressing but have not been widely used in the rock products industry. One important use that they have in this field is separating sand from lignite and other unwanted materials that are lighter than silica. Used in connection with a screen, they can be made to give very clean fine and coarse products.

Since this type of classifier varies so much from the free settling classifier it will be described in a separate chapter. The ordinary laws of settling do not apply to it; in fact the whole process is different.

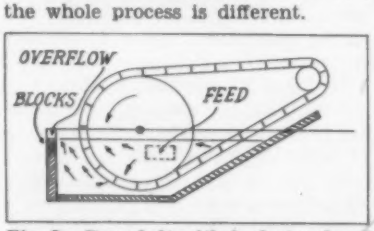


Fig. 7a: Drag belt with feed at end and side overflow

Classifiers are very simple and do not require an undue amount of attention, but the principles on which they operate must be understood and adhered to for satisfactory results. They must be (1) properly installed, (2) properly fed, and (3) properly adjusted, and kept in proper adjustment. More than once the writer has traveled hundreds of miles to make an adjustment the need for which was so evident that a child should have seen it—if he had read the instructions that came with the classifier.

A classifier should never be set back in a corner, or in any other place where it cannot be seen easily. All parts should be accessible for inspection, repair and adjustment. Not only the placing but the arrangement of the launders should be such that the operator can get at any part of the classifier easily, and if a launder must be in the way it should be made with a moveable section that can be taken out and put back without disturbing the remainder.

Tools are often dropped, and other unwanted things occasionally get knocked into a classifier. A coarse screen may help to prevent this source of trouble. There should be some arrangement on the drive, if it is a mechanical classifier, so that nothing will be broken when this happens, a shear pin, a cut-out on the

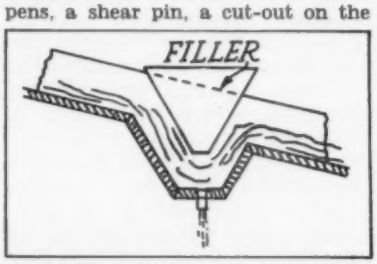


Fig. 6: The Spitzlutte. Regulation is by raising and lowering filler. This is an old form but still in use

motor, or a belt that will throw itself easily. In addition, there should be a drainage plug. Most commercial machines have these, but not all of them; and when one is lacking it should be supplied at once. The plug should be large enough to empty the classifier quickly, and a permanent or temporary launder should be ready to carry off the drainage.

(*To be continued*)

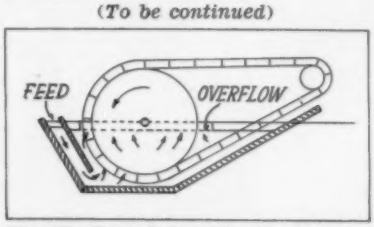


Fig. 7b: Drag belt with side feed and adjustable end overflow

How Accurate Are Sieve Tests?

ARTICLE SEVEN

On crushing, sizing, testing and specifying of aggregates contains hitherto unavailable data

By ELWOOD T. NETTLETON*

SINCE most successful commercial crushed stone plants are erected by necessity at locations adjacent to large deposits of rock of uniform nature, the chemical and physical properties vary little so that periodic tests perhaps once a year are sufficient. This does not hold true, however, with gradation tests which may vary within the same day much to the distress of the producer and consumer. Therefore the latter tests assume a great importance and need constant attention and checking. This in turn for economic reasons calls for a company owned machine to run gradation tests only. The necessary equipment to carry on these tests; such as compression, tension, cross-breaking, percent of wear, French coefficient of wear, Los Angeles rattler, hardness, toughness, freezing and thawing, and chemical analysis would be very costly. This testing therefore was done outside of the company's laboratory, with the exception of specific gravity and weights.**

Possibility of Error in Gradation Testing Machine

With the installation of a testing machine (see ROCK PRODUCTS, July, 1939, p. 33) for the gradation of the stone, the first natural task was the determination of the accuracy of the results which we might expect to obtain. In other words, we must ascertain wherein lies possible error and to what extent this error might be eliminated.

With the machine automatically set as to the frequency and intensity of vibration, having an automatic timer for the period of vibration, the chances for error appeared to be the following:

(1) Mistake in weighing.
(2) Mistake in calculations.
(3) Breakage in testing machine.
(4) Divergence in testing machines of like model.
(5) Divergence between testing machines and hand placing.
(6) Difference in weights of samples placing varying loads on screens.
(7) Wear on screens in testing machine.

SUMMARY OF PHYSICAL TESTS

Sample	No. 1 Middlefield	No. 3 Rocky Hill	No. 4 Plainville	No. 5 Granby	No. 6 Cheshire	No. 7 North Branford
% of Wear	2.1 (a) 2.5 (c)	1.7 (a) 2.6 (c)	2.1 (a) 1.7 (c)	2.1 (a)	—	1.6 (a)
French Coef. of wear	19 (a)	23.8 (a)	19.4 (a)	18.9 (a)	—	25.0 (a)
Hardness	17.7 (a)	18.2 (a)	18.1 (a)	17.2 (a)	—	18.7 (a)
Toughness	20. (a)	24 (a)	22 (a)	12 (a)	—	27.0 (a)
Water Absorbed per c.f.	.26(a)	.55(a)	.30(a)	—	—	0.12(a)
Coef. of Wear	8.0 (b)	—	13.3 (b)	—	—	—
Los Angeles Rattler	17.9 (c)	13.2 (c)	14.4 (c)	—	18.3 (c)	16.9 (c)
Deval Abrasion	2.7 (c)	2.8 (c)	2.2 (c)	—	3.3 (c)	2.3 (c)
Cementing Value	Excellent (a)	—	—	Excellent (a)	—	181.0 (a)
Weight per cubic foot	—	—	—	—	—	187.0 (a)

Ref.—(a) Bureau of Public Roads. (b) New York State Highway Department (c) Connecticut State Highway Department.

SUMMARY OF CHEMICAL TESTS

Essential Minerals	No. 1	No. 7
Plagioclase—Silicate of alumina, lime and soda	43.9%	32.8%
Augite—Silicate of lime, magnesia, iron and alumina	41.4%	33.4%
Olivine—Silicate of magnesia and iron	—	11.6%
Accessory Minerals		
Magnetite—Magnetic oxide of iron	3.7%	2.6%
Secondary Minerals		
Kaolin—Hydrous silicate of alumina	5.1%	14.0%
Chlorite—Hydrous silicate of magnesia, iron and alumina	5.9%	—
Serpentine—Hydrous silicate of magnesia and iron	—	5.6%
Limonte—Hydrous oxide of iron	—	
	100.0%	100.0%

Remarks—No. 1. Fine grained gray black diabase composed essentially of plagioclase (labradorite) and augite.

No. 7. Fine grained gray black diabase composed essentially of kaolinized plagioclase (labradorite) augite and serpentinized olivine.

The first two were personal errors which were eliminated by weighing the sample as a whole before testing; by weighing each individual size separately; and by the final weighing of all individual sizes as a whole. Calculations were all recorded and rechecked on standard forms, of which a sample is shown on the following page.

Breakage in Testing Machine

Three samples of each of five different sizes of stone were tested, making a total of 15 tests in all. The total average breakage of all sizes, using all the intermediate screens, was 0.7 percent. The maximum breakage for the average on any single screen was 2.3 percent. The maximum breakage for any one single test, on any one single screen, was 3.1 percent.

* Engineering Director and Secretary, New York Crushed Stone Association, Albany, N. Y.

** These tests are shown in the accompanying table as an illustration of the data every operator should have at hand.

With these figures as a result, it would be safe to say that the breakage caused by the testing machine was under 1 percent for an average. This factor, as compared with the large error in obtaining representative samples for testing, is quite negligible.

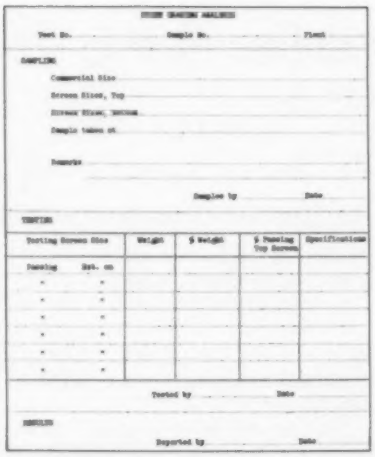
Comparison of Similar Testing Machines

Three samples of each of five different sizes of stone were tested, making a total of 15 tests in all, at our Cheshire laboratory. The samples were saved and reshipped to the Connecticut State Highway Testing Laboratory at Portland, Conn. At this laboratory there is the same kind of a Ty-Lab testing machine as our own. Without knowledge of previous results, these tests were run, employing the same sizes of testing screens in each case. The average deviation combining plus and minus for all the sizes was 1.3 percent. On all sizes except one, the deviation was plus. In other words, there was more stone passing through the screens at Portland. Considering that breakage in our testing machine, due to our testing was 0.7 percent, the actual difference or error in testing machines was 0.6 percent. The testing screens at both places were calipered and no apparent difference was noticed. Nevertheless, this six-tenths of one percent might easily be accounted for by the wear in the screens at the Connecticut State Highway Laboratory, which have been in use for several years. However, as stated above, this factor is quite negligible as compared with errors in sampling.

Comparison of Testing Machine and Hand Placing*

Five times, after five tests were run through the machine, the segregated sizes were passed by hand orientation through the screens on which they had been retained. Only three pieces out of 385, of the pieces 1 in. and larger, passed through. This would amount to 0.8 percent. In other words, the testing machine appeared to have an efficiency of 99.2 percent. On the stone under 1 in. in size, none of the retained stone succeeded in passing further by hand placing. In this case the efficiency of the machine was 100 percent. This may be accounted for by the fact that the smaller size stone in trap rock are chips, usually

* The reader should not consider this test, comparing testing on the job by means of hand shaking screens, with machine testing in the laboratory. Hand shaking on the job is extremely variable depending entirely upon the ambition or fatigue ratio of the operator.



STONE GRADING ANALYSIS

Test No. ..... Sample No. ..... Plant .....

SAMPLING

Commercial Size .....

Screen Sizes, Top .....

Screen Sizes, Bottom .....

Sample taken at .....

Remarks .....

Sampled by ..... Date .....

TESTING

Testing Screen Size	Weight	% Weight	% Passing Top Screens	Specifications
Passing Rej. on				
" "				
" "				
" "				
" "				
" "				
" "				

Tested by ..... Date .....

REMARKS

Reported by ..... Date .....

Standard forms used by New Haven Trap Rock Co. to record stone grading analyses

inclined toward flat and elongated shapes, rather than cubical. Thus, they would have a better chance of passing than a cubical stone.

Difference in Weights as Affecting Accuracy

Inasmuch as it was thought that the weight of the sample might have something to do with the overcrowding of the screens in the testing machine, tests were run using a 2-in. mixed stone and ½-in. stone with samples of 100 lb., 75 lb., 50 lb., and 25 lb. An effort was made to obtain identical samples. It was quite noticeable in the case of mixed stone that this was almost impossible as the two 50-lb. samples differed as much as 8.01 percent in passing the 2-in. screen. Consequently, the results of the 25-lb., 75-lb., and 100-lb. samples showed no consistency from which a conclusion could be drawn.

In the case of the ½-in. stone, a much easier size of stone for obtaining fair samples, the two 50-lb. samples were within 0.7 percent of each other at their greatest deviation. Assuming, therefore, that all five samples were practically identical, it can be easily seen from a table that in the case of the ½-in. stone, which is naturally a very uniformly sized stone, all the stone passed easily through the top screens.

Considering the theory on screening, it is quite evident that with a uniform stone of a size, almost the same as the screen opening, it is considerably more difficult for the grains to pass the given opening. Add to this fact an overcrowding of the screen, causing a blanketing effect whereby some of the stone cannot reach the opening, and the variances of 71 percent passing the ½-in. screen in the 100-lb. sample; 80.7 percent in the 75-lb. sample; 87.2 percent and 87.9 percent in the 50-lb. samples; and 88 percent in the 25-lb. sample, a difference of 17 percent may be accounted for.

In other words, it would be safe to say that for this type of testing machine, samples of the smaller uniform sizes of stone should not be over 50 lb. Should larger samples be received, two tests should be run, and the weights added together before making calculations.

It is also safe to conclude that samples of mixed stone taken in the field should be at least 75 lb. or over, and two operations of the testing machine run with the sample approximately divided in half and the results added together.

Calculated Accuracy of Tests

Thus, we have arrived at an estimated average error of 0.7 percent for breakage, and 0.6 percent for difference in testing machines, and a maximum individual error in any particular size ranging from 0 to 11 percent, but whose average is less than 1 percent. It is understood that this 11 percent error happened only once in 30 tests, on 6 different screens, or, in other words, one out of 180 times. Therefore as a general rule it is quite reasonable to assume that the accuracy of testing, using equipment and methods and including possible variances as shown should be well within two percent.

In order fully to understand this degree of accuracy, it should be compared with accuracy in sampling. It was noted that in selecting a 50-lb. sample of 2-in. mixed stone (2½-in.-1-in.), if three pieces of stone in the sample ranging in size from 2 to 2½ in. were left out, the results would be affected by 2 percent, since these three pieces would weigh together 1 lb., and, with an assumed 15 lb. retained on the 2-in. square opening testing screens, the error on that one screen would be 1/15 or 6.7 percent, or, with an assumed 12 lb. retained on the 2-in. square testing screen, the error would be 1/12 or 8.3 percent. (See next section on "Human Error in Sampling" to appear in ROCK PRODUCTS for November.)

Thus it will be seen that the errors in testing are well within the errors in sampling, when even the best judgment is used in sampling.

NOTE: In coming issues of ROCK PRODUCTS, sampling methods, stone grading, and bin segregation problems will be discussed.

(To be continued)

Most Modern Lime Plant!

Gas-fired, shaft-kiln plant of Gypsum, Lime and Alabastine, Canada, Ltd., Beachville, Ontario, has low fuel and labor costs and relatively low investment

By VICTOR J. AZBE

THE latest notable forward advance of the lime industry was the placing in service of an entirely new vertical-kiln lime plant by the Gypsum, Lime and Alabastine, Canada, Limited, at Beachville, Ontario. The construction of this plant was dictated by the ever more emphatic command, "Make good lime and make good lime cheaply or you are doomed to oblivion." It is getting so more and more, that failure to follow this dictum means probably continuation in business, but without any real profit at any time, and frequently at a considerable loss.

Those responsible for this rather unique and model plant realized that because there is a tendency for some recklessly to dictate the market price, a plant in the future will have to be able to battle competition under several fundamental requirements:

(1) It should have cheap stone of good quality delivered cheaply to the kilns.

(2) It must have a high fuel efficiency, as fuel costs almost always are a considerable portion of the total cost of the lime.

(3) It must be efficient in labor, since today with high labor costs, no one can compete satisfactorily with highly mechanized plants, when men are virtually stumbling over each other firing, picking, loading, charging, passing coal, and this or that, as often is the case.

(4) In addition to all the above such a plant must be of low investment cost per unit of output so that excessive overhead will not offset other advantages.

In this country there are now many plants that along some of the above lines are noteworthy. However, almost always the aim is defeated by glaring deficiencies along other lines. Of what ultimate good is it to have a high fuel efficiency with high labor costs?—none if the plant is not placed definitely in the money making class. Of what good is it to have an efficient plant considered from all angles but of such high cost that the overhead burden destroys all and every advantage? There are several such plants built in recent years, beautiful plants, composed of magnificent buildings and containing most varied kinds of machinery, but does that all mean anything, should we not be cold to mere appearances and consider primarily intrinsic values?

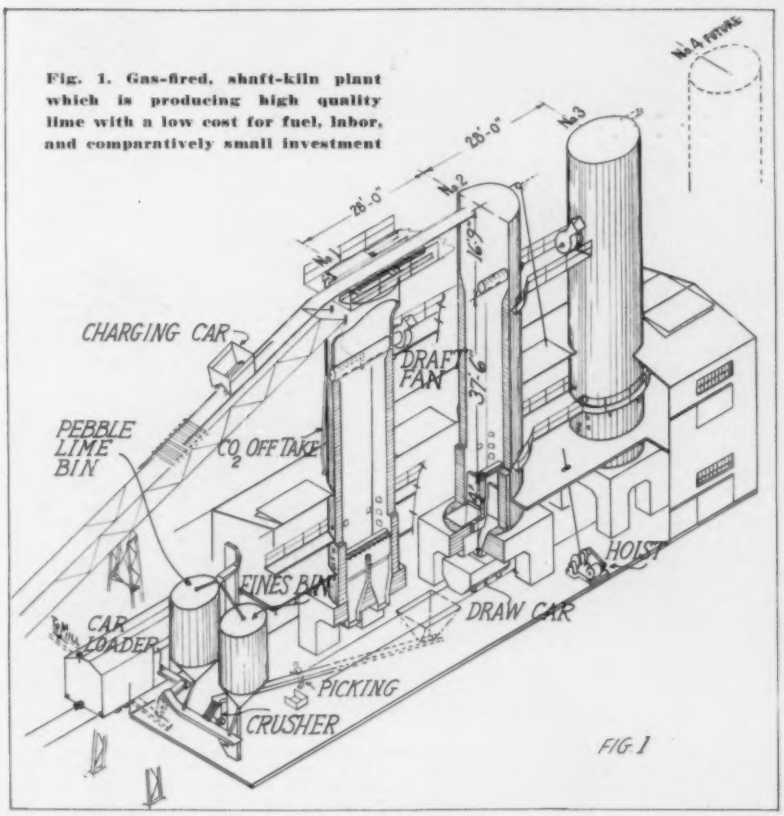


Fig. 1. Gas-fired, shaft-kiln plant which is producing high quality lime with a low cost for fuel, labor, and comparatively small investment

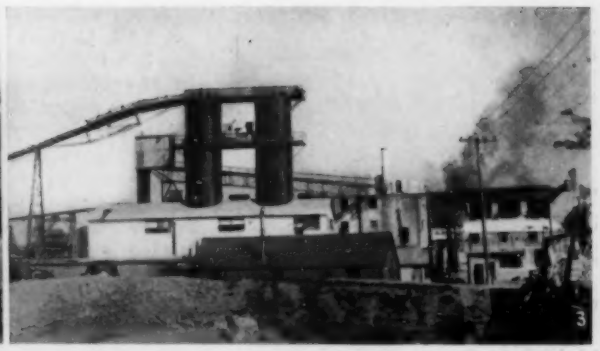
Build New Plant Rather Than Remodel Old

Ordinarily it is very difficult to obtain a plant satisfactory in all respects; old plants by reconstruction can be improved, often greatly improved, but the utmost can in this way never be reached. It practically is necessary to build a completely new plant to create a perfect plant. But by perfect, we do not mean here, technically perfect, but rather perfect in an economic sense, where every dollar invested is made to count. The writer feels that until now there was no such lime plant in existence, they were good along one or more lines but none along all lines as is the case with this new Canadian plant.

J. H. Robinson, general superintendent of lime plants for Gypsum, Lime and Alabastine, has, in addition to certain other kinds of plant, six quite diverse lime plants in his charge, all well operated and all fair profit bearing, but all old and evidently not the kind that would lend themselves to battling the conditions of intense competition so generally developing.

Evidently, it was in order to do something, but to change the old kilns was not the thing, to build new kilns in the old plant also was not; by such means conditions would have been improved, no doubt, but a truly satisfactory state of affairs would not have been created, and more than likely much money would have been wasted. At best not the most would have been realized, and

Figs. 6 and 7, showing method of dumping stone into kiln. Fig. 8: Looking down into kiln which is of the submerged gas off-take type. Fig. 9: Gas can be directed independently to eight different kiln sections. Fig. 10: Closeup of burners. Fig. 11: Kiln is well supplied with poke holes for operator's convenience. Fig. 12: J. H. Robinson, general superintendent at the instrument board. Fig. 13: Moving lime car over lime pit. Fig. 14: Picking conveyor taking lime from pit



Left: Fig. 2. Old plant at Beachville, now standing idle. Right: New lime plant having only two shaft kilns can produce as much lime as seven at the old plant

the worse, the plant would still have been an old plant.

So the unusual decision, seldom arrived upon, was made, to wipe the slate clean, to build an entirely new plant and abandon and forget the old one. It is seldom that such a radical change is made as it requires a rather considerable amount of gumption, if that is the word, to do such a thing, for which the credit is solely Mr. Robinson's.

We are familiar with at least one other plant where such a complete change was made, this being the National Carbide Co. plant at Ivanhoe, Va., and the succeeding years fully demonstrated the wisdom of the move. But that was ten years ago, today the accumulation of knowledge on lime and lime production is much more complete than it was then, giving greater reason to start with new methods and so make full application of this knowledge possible.

Mr. Robinson started the planning with exemplary care. Nothing was taken for granted, all of the more recently constructed American lime plants were studied and even features of European plants were considered. Although towards the end there was considerable hastiness of construction, the planning period was of long duration and not a stroke of work was done until the final shape of completed plant was visualized, not only in mind but on paper as well (Fig. 1).

The original specifications were rather rigid. The plant was not to cost more than $500 per ton of daily capacity. Fuel consumption was not to be more than 5000 cu. ft. of natural gas per ton of lime. Labor was to be less than 40 cents per ton for charging of kilns, firing, drawing, trimming, picking and loading of lime. There is considerable satisfaction in the fact that every one of this set of requirements was bettered; and the result is that the plant can well serve as an example to the industry: a plant that is not only efficient, but a plant that is economical in final analysis as well, and a plant that looks and responds to treatment as does a plant manufacturing a chemical.

A visit at Beachville to the old plant, first, (Fig. 2) now standing idle, and then to the adjacent new plant (Fig. 3), startlingly reveals the great difference in the obsolete and the modern. Although the active equipment was reduced from ten kilns to two, plant capacity was greatly increased, since one of the new kilns can produce the lime of seven of the old.

The Beachville quarry is shovel operated (Fig. 4); to obtain cheap stone this is almost necessary. Trucks deliver the stone directly to and dump it into the crusher. From the crusher the stone passes over the various screens into the respective bins, the entire operation being quite simple but effective. The equipment investment is low and so stone is quite cheap. The entire stone operation (Fig. 5) is old, the new portion starting at the outlet of the previously existing stone bins.

Kiln Charging Operation Handled By One Man

In most plants for charging the kilns, three men are needed, one at the hoist, one on the kiln top and one to couple the cars. Some plants get by with only two, others by contrast seem to want to use as many

Fig. 4: Quarry from which limestone is obtained, showing shovel that loads into trucks which carry stone direct to crusher. Fig. 5: Crushing plant which was not changed when new lime plant was built

Fig. 15: Group of four men who collectively conceived, designed and erected the plant

as possible rather than as few as possible. In no other way does the Beachville plant reveal its difference from the common herd as through the fact that one man only is needed. There is no other plant accomplishing this operation with only one man. He fills the 4-ton car from the bin, steps over to the hoist, starts the car on its way up the incline. When the car reaches the respective kiln into which it is to dump, the kiln doors open and, at the very precise moment, the car gates also open and the stone slides into the storage section of the kiln. As soon as the car is backed off the kiln, doors close again and the car rolls back to the bin, there to have its gates closed and to be filled for the next trip up (Figs. 6 and 7).

The isometric sketch, Fig. 1, reveals the nature of the kilns, their general dimensions and their arrangement. Through a long series of predecessors, they are highly evolved and built so that they consist of a minimum of steel and brick and a maximum of shaft space, which in turn is devised for the very highest rates of production, somewhere between 75 tons to 80 tons of high calcium lime per day or close to 2500 lb. per square foot of shaft space per hour.

Use Natural Gas

The kilns are of the submerged gas offtake (Fig. 8) type; that is, the upper part of the kiln is storage zone, merely holding the rock ready to follow into the active part of the kiln after the lime is drawn. This arrangement has several advantages. The active kiln portion remains full all of the time, the kiln can be charged at any convenient time, fan temperatures are equalized, draft is more constant and all of the stone obtains about the same kiln time. These kilns are drawn every two hours, and so receive stone automatically every two hours, therefore, the waste gas temperature at the fan fluctuates in a regular cycle from only about 300 deg. F. to about 600 deg. F. at the highest.

As natural gas is now available in southern Ontario, it was decided to use this fuel, in spite of its high cost of 35 cents for each 1000 cu. ft. But in every design step, eventual possibility of using gas producers was taken into consideration. Even today, drawings are ready showing exactly where the producer would be located and how it would be connected to the kilns, against the time when that may become necessary.

The firing is, in the main, through a sectioned center burner (Fig. 9). Gas can be directed independently to eight different kiln sections. In addition there are eight side burners so the gas to any portion of the kiln is under a rather complete and better control than ever was achieved before. With this gas when desired some CO_2 is supplied, this being drawn from the kiln top by the suction effect created by the high pressure natural gas blowing through injector nozzles. The CO_2 is obtained from a point where there is no dilution from the leakage air from the charging doors and is brought to the burners (Fig. 10) through heavily insulated pipes so as to conserve all the heat possible. This recirculating gas is ordinarily at a temperature of 1000 deg. F. or more. The aim is to have it as hot as possible although its purpose is to cool the hot zone.

The kiln is well supplied with poke holes and equipped with platforms, all strategically located to permit satisfactory trimming (Fig. 11) of the line on every draw. Even though the kilns are drawn every two hours and later at the highest capacity may be drawn even more frequently, still the lime practically always hangs and permits the so important trim.

Fuel Costs

The whole set-up is quite different from the furnaces and firing system that was used on the old kilns and that still are used in many other plants. Such old crude methods would not have permitted the use of as expensive a fuel as natural gas at 35 cents per thousand cubic feet.

Gas at this price equals good high grade coal at $9.90 a ton, so fuel economy is extremely important; and it is obtained, for the fuel cost is less than $1.57 per ton, which means a fuel ratio on an equivalent coal basis of 6.3 to 1. If we further take into consideration that of the heat in natural gas less is "available" to lime making, than of heat in coal, the ratio on coal basis comes closer to 7 to 1.

The plant is a very interesting demonstration that although gas is far more expensive than coal, an equivalent of $9.90 compared to $6.78, fuel cost per ton of lime is less, being only $1.57 compared with the previous $1.84. Not a big difference, it is true, but because the fuel is natural gas, other important advantages are realized.

However, if an additional $20,000 were to be spent, a gas producer could be installed, with which a fuel ratio of about 6 to 1 would be realized. That would mean a fuel cost of $1.13 a ton or 44 cents less, which would have been more than ample to take care of the additional investment and labor necessary with a gas producer as compared to natural gas.

With gas so expensive, the utmost must be done to obtain efficiency and so precise adjustments are very necessary. Fig. 12 shows J. H. Robinson, general superintendent, and the prime mover of the venture, at the instrument board on which are mounted the various gas meters, pyrometers, draft gauges, gas analyzing instruments and valves for adjustment of draft and control of gas. The fireman is furnished with a table that lists what the gas setting, the draft setting and the draw period should be for any kiln capacity ranging from 20 to 80 tons of lime. He need only be told the rate of production desired and in a short time he has kilns adjusted to it.

(Continued on page 74)

EDITOR'S NOTE

Just a word about this "Lime Forum" article. Our good and capable friend, Vic. Azbe, is the contributing and consulting editor, and he has a free rein to use these pages for the good of the cause. However, we just want to warn our readers that it was largely Mr. Azbe who conceived, designed and superintended the construction of this lime plant he describes. We asked him to describe it, although we visited and illustrated the plant (Rock Products, July, 1939, pp. 44-45). To Mr. Azbe this plant is at least the partial consummation of many years' planning and dreaming on the "ideal" shaft-kiln lime plant. Therefore, we trust you will pardon his seeming lack of modesty (enthusiasm!). To have edited this too much would have denatured our contributor's individuality.

—The Editor.

Rubber and It's Substitutes

Rock products industries are using rubber in large quantities for many purposes and new uses are constantly being discovered

By NATHAN C. ROCKWOOD

ONE of the United States' most important necessities is rubber; about half the world's production has to be imported here. There are said to be 3200 different products already in use, requiring rubber, or a synthetic substitute. For most purposes rubber is the more desirable, but for others the synthetic product has virtues not possessed by rubber.

A survey of our own industries shows a variety of uses for rubber, although probably none are peculiar to these industries. However, it is so important to operation in most of these industries that any shortage due to war conditions or other causes would be serious.

A statement to members of the Rubber Manufacturers Association was recently sent out reassuring the industry that adequate supplies will be made available in this country and cautioning against "contributing to present hysterical activity in the commodity markets."

Motor Vehicle Tires

The largest industrial use of rubber is of course for motor vehicle tires. This probably is its largest use in the rock products industries. With the increasing use of tractors, very large trailers and motor trucks, and for rough going on construction jobs, a great deal of recent research has been done on tires for these kinds of industrial equipment, used also by producers of rock products. As a result there are tires especially made for different kinds of service, and the producer who has a special problem, such as hauling 20-ton loads of stone out of a quarry over sharp fragments of stone on the quarry floor, can get a great deal of useful advice from the tire

Conveyor Belting

Probably the next largest use of rubber for rock products' plant equipment is for the manufacture of conveyor belting, and to a less extent transmission belting. No substitute for belt conveyors in the economical handling of most rock products has ever been discovered. Belt and bucket elevators are less commonly used than formerly, but in most instances they have been replaced by belt conveyors.

Experience with conveyor belting varies greatly because there are several types and qualities, and vastly different climatic conditions to be met. Also, as with motor vehicle tires, much depends on whether the belting is fairly used or abused. There is an extensive literature on belt conveyors, their proper alignment and care. Alignment is far more important than the average operator realizes. The use of aligning idlers could be greatly increased if longer life of belting is wanted.

More belting in these industries rots out than wears out. It is very important to repair quickly all cracks or tears in the protective rubber covering of belting exposed to the weather, for moisture and sunshine speedily rot the belt fabric. With good care a 5-ply, 28-oz. duck, 18-in. wide belt has been known to last 17 years and carry 1,700,000 tons of sand and gravel before actually wearing out. The average life at sand and gravel plants is probably about three years.

Crushed-stone plant service is harder on belting than is sand and gravel plants, chiefly because the stone is sharp edged. A great deal can be done to lengthen the life of belting at crushed-stone plants by proper attention to details for feeding the conveyors. If dust and small sizes are allowed to flow to the belt ahead of the larger fragments, they act as a cushion and do much to save the belt from unnecessary punishment.

For handling oil-treated coal and other oily products synthetic rubber has been successfully employed in the manufacture of conveyor belting. It is said also to resist abrasion as successfully as rubber, in this case.

Dredge pumps and crushers are still largely belt-driven, although

Left: Typical application of pneumatic tool hose in quarrying. Center: World's largest conveyor belt, in operation at Grand Coulee Dam. It is 9200 ft. long and hauls 2000 tons per hour. Right: Two 14-in. 8-ply belts drive paddle wheel on tow boat

much of the other equipment in modern plants that was formerly belt-driven now has direct drives through some form of speed reducer. Belt drives for pumps and crushers are generally considered best because these are usually some distance from the power-driving unit and because the belt lines are usually considered desirable as a safety factor. Pumps and crushers are subject to suddenly applied heavy loads, and it is better to slip the belt than break the machine.

During the last few years multiple-strand V-belts, with short center drives, have largely replaced the flat transmission belting, and the tendency is all in this direction. The advantage of the V-belt is of course that with grooved pulleys it provides much more gripping surface and there is less slippage. However, V-belts are being used on flat surfaced pulleys to some extent.

Chute and Flume Linings

A fairly recent use of rubber in the rock products industry has been for lining chutes and flumes. At first ordinary rubber sheeting—in many cases strips of old belting—was used. Recently special products such as steel plates with rubber vulcanized to them have come into use. Rubber is more resistant to simple abrasion (or rubbing) than steel, especially in handling wet materials. When handling silica sand where extremely low iron content is necessary it may be desirable to use rubber-lined chutes to insure purity of the product.

Because of its resistance to abrasion rubber linings for ball and tube mills have been tried for wet grinding in the portland cement industry, but so far as known this use of rubber never got beyond the experimental stage and no manufacturer is now using it. Rubber is, however, considerably used for lining sand and gravel pumps.

Recently a patent was issued in England on rubber-covered grinding elements for use in grinding raw materials in cement manufacture. The object is the concentration of the lime-bearing material which will be in the coarser classification.

Hose and Couplings

Wherever compressed air tools are used, and that includes practically all rock products plants, hose made with rubber is required. Where such hose is subject to contact with grease, oils, gasoline, etc., some of the new synthetic rubbers are preferable because these are made practically immune to oils that destroy rubber.

Flexible couplings for dredge pipe handling sand and gravel constitute a very considerable and important use of rubber in these industries. Flexible couplings can be made without the use of rubber, but the rubber ones are undoubtedly the cheapest to install and operate.

Insulation of Cables

Another important use of rubber in these industries is for the insulation of electric cables, particularly those used to connect heavy pieces of outdoor equipment. For this purpose some of the synthetic rubbers are proving desirable for the same reasons already mentioned — resistance to oils as well as water.

One might go on indefinitely to mention minor uses of rubber such as shock pads under pieces of machinery. The use of rubber-pad mountings of vibrating screens, for example, has done as much to take the "shimmy" out of screening plants as rubber-pad mountings of motors have taken excessive vibration from automobiles.

Mineralizers in Cement

(Continued from page 42)

lieved that most of it is retained in the presence of the large excess of lime.

The use of magnesium fluosilicate may have the following applications: (1) in the manufacture of portland cement mixtures of normal compositions:—to accelerate the rate of reaction of lime with silica and lower the temperature and time of heating required, which should give an increased economy of fuel; (2) in the heating of white portland cement mixtures: — to facilitate complete combination of lime and silica in the presence of small amounts of Al_2O_3 only; (3) in the preparation of sulphate-resistant cements:—to permit reduction of R_2O_3 content and still obtain a "well-burned" clinker. This is desirable because reactions involving the alumina and iron compounds of portland cement are known to be partially responsible for its disintegration when exposed to the action of sea-water and sulphate solutions.

Probably other fluosilicates may have mineralizing activities comparable to those of $MgSiF_6$. Calcium fluosilicate might be somewhat less effective, since, as a rule, smaller ions like Mg are more active than larger ions like Ca. An objection to the use of $CaSiF_6$ is its instability, as it is partially decomposed in the presence of water to a precipitate of silicic acid and calcium fluoride and a solution of fluosilicic acid; whereas $MgSiF_6$ dissolves without excessive hydrolysis. The alkali fluosilicates might be suitable except for the undesirability of increasing the alkali content of cement raw mixes. The addition of 1 percent $MgSiF_6$ introduces only 0.37 percent MgF_2 into the raw mix. If this is calculated to the oxide, as would be the case in ordinary analyses, it is equivalent to 0.24 percent MgO.

The use of magnesium fluosilicate as an aid in the manufacture of portland cement clinker appears to have the following advantages: (1) it is a cheap industrial chemical, being obtained as a by-product in the manufacture of phosphoric acid and "superphosphate" fertilizer; (2) it is a very soluble compound (37.94 g.$MgSiF_6$.$6H_2O$ per 100 g. solution at 20 deg. C[14]) and can be easily added to the cement mix slurry in the wet mixing process of portland cement manufacture; in the dry mixing process it can be readily introduced in powdered form; (3) it is extremely active in amounts of only 1 percent.

The author is indebted to P. H. Bates, who suggested this problem and its method of study, and to L. S. Wells for helpful suggestions.

REFERENCES

[1] Erdmenger, Tonind. Ztg., p. 27 (1882).
[2] P. H. Bates, unpublished data.
[3] E. T. Carlson, unpublished data.
[4] P. H. Bates and A. A. Klein, BS Technologic Paper 78 (1917).
[5] E. P. Flint and L. S. Wells, J. Research NBS 17, 727-752 (1936).
[6] H. S. Roberts, J. Opt. Soc. Am. Rev. Sci. Instr. 11, 171-186 (1925).
[7] R. H. Bogue, Ind. Eng. Chem., Anal. Ed., 1, 192-197 (1929).
[8] W. Lerch and R. H. Bogue, Ind. Eng. Chem., Anal. Ed. 2, 296-298 (1930).
[9] F. M. Lea and T. W. Parker, Phil. Trans. Roy. Soc. (London) A 234, 1-41 (1934).
[10] G. A. Rankin and F. E. Wright, Am. J. Sci., 4th Series, 39, 1-79 (1915).
[11] A. S. Halland, Ind. Eng. Chem. 3, p. 65 (1911).
[12] W. Eitel, Zement, 30, 455-459, 649-472 (1938).
[13] S. Nagai, J. Soc. Chem. Ind. (Japan). Suppl. Binding 39, 130-132 (1936).
[14] K. K. Worthington and M. M. Haring, Ind. Eng. Chem., Anal. Ed. 3, 7-9 (1931).

FROM THE STANDPOINT of national defense, mica serves many useful purposes, according to a Bureau of Mines report. Without adequate supplies of this indispensable mineral, the report points out, the army and navy would be handicapped seriously because our modern means of rapid communication by telegraph, telephone, or radio would fail to give warning of the advance of armies, ships, or enemy planes, and much of our electrical equipment would be unserviceable.

NATIONAL ASSOCIATION ACTIVITIES

Crushed Stone

ADMINISTRATIVE DIRECTOR, J. R. Boyd of the National Crushed Stone Association has requested that all companies promptly return the questionnaires recently sent out with the information covering hourly earnings of their employes. This questionnaire has been sent out in compliance with the request of L. Metcalfe Walling, Administrator of the Walsh-Healey Public Contracts Act. The information will be used in determining the prevailing minimum wages in the industry, and no individual company's figures will be given out.

Sand and Gravel

STANTON WALKER, director of engineering, National Sand and Gravel Association, presented an interesting report in a technical information letter under the subject, "Chert Gravels Under Fire." Reference was made to the paper by Curtis Cantrill and Louis Campbell of the Kentucky State Highway Department presented before the last annual meeting of the A.S.T.M. in which the authors summarized the results of some laboratory tests and of a survey of nearly 1100 miles of concrete pavement. The conclusions of this paper stated that the failure of concrete pavement throughout the western part of the State was due to the use of chert gravel obtained from the Tennessee and Cumberland Rivers in western Kentucky. It was further stated that Tennessee or Cumberland River sand will produce durable pavement when used with Ohio River gravel or crushed limestone. However, the paper referred to chert gravels in western Kentucky only and did not apply to chert gravels in general. Mr. Walker pointed out that cherts vary greatly in physical characteristics and some of them have given excellent service records, but the problem is to distinguish between sound and unsound cherts. Studies are now being made by the association laboratory of samples of cherty gravel which show the absorption percentages of these samples. While some of the samples of the more porous cherts show a high rate of absorption, no definite conclusions may be made at this time.

Mr. Walker's technical letter to the industry also contained a very searching criticism of the Bureau of Standards simplified practice recommendation on Coarse Aggregates R163-36, Crushed Stone, Gravel and Slag, which was sent in by one of the member companies. The critic of the simplified practice recommendation expressed the belief that the gradings will be very difficult to produce and can only be produced at an extra cost. He further stated that it will be impossible to produce a large and smaller size that are intended to be used together by a single screening separation on a production basis. It will be necessary to perform a secondary screening at low capacity or, more practicably, to remove and recrush a "middling" material.

COMING CONVENTIONS

American Road Builders and Road Show, Chicago International Amphitheatre, Chicago, January 29 to February 2.

Chemical Exposi- Grand Central Palace, New New York City, December 4 to 9.

National Concrete Masonry Association, National Cinder Concrete Products Association, and Cast Stone Institute, Mayflower Hotel, Washington, D. C., February 12, 13, and 14.

National Crushed Stone Association, Hotel Jefferson, St. Louis, January 22, 23, and 24.

National Industrial Sand Association, directors' meeting, Palmer House, Chicago, October 20.

National Safety Congress and Exposition, Atlantic City, N. J., October 16 to 20.

National Sand and Gravel Association and National Ready Mixed Concrete Association, Hotel Jefferson, St. Louis, January 17, 18, and 19.

Industrial Sand

PRESIDENT HAY has announced that the regular semi-annual meeting of the board of directors of the National Industrial Sand Association will be held on October 20 at the Palmer House, Chicago, Ill., commencing at 10 a.m. These meetings are open to the entire membership.

A questionnaire has been sent out to the membership seeking information which it is necessary the association should have in presenting its case for seasonal exemption under the federal wage and hour law. After full consideration of the results of the most recent hearing, it has been decided to concentrate further efforts on seasonal exemption for producers of natural bonded foundry sand, crude silica sand, and industrial sand produced in exposed plants involving the use of water, wherever the climatic conditions surrounding such operations are such as to establish a prima facie case that they are seasonal in character.

Lime

IN THE SEPTEMBER issue of Limeographs, issued by the National Lime Association, attention is called to the use of lime as a stabilizing agent in gumbo clay for roadbeds. This is a process developed by Sherman D. Lesesne, chemist, Texas State Highway Laboratory. It is estimated that this process will require about 200 tons of lime per mile of highway treated. Plans are under way to build short sections of test roads. Mr. Lesesne advises that before a roadbed will "hold up" traffic, it must have a minimum stability of 250 p.s.i. when penetrated as described in the test procedure. Some specimens recently taken from roads have tested up to 5000 p.s.i. The asphaltic topping of the road is about one inch thick and the clay-lime roadbase usually is about 6 to 8 in. thick.

"Hot Mix" Producers

ROBERT TOTTERDALE, president of the Tri-State Asphalt Corp., was reëlected president of the Hot Mixed Bituminous Industries of Ohio, Inc., at a recent meeting in Columbus, Ohio. Herbert J. Murphy was elected vice-president and C. W. Simpson, reëlected secretary.

Hints and Helps

★ FOR SUPERINTENDENTS ★

Cut Loading Time for Blasting

By J. L. TEEL,
Quarry Superintendent,
Keystone Portland Cement Co.

IN THE ILLUSTRATION is shown the easily built, hand machine we use in our quarry to load dynamite in big blast holes. The tripod is built of

Easily built hand machine for loading dynamite in blast holes which cuts loading time about 30 percent

2-in. x 4-in. x 10-ft. fir lumber with braces bolted on the three sides. The drum is made of a piece of 6-in. diameter x 14-in. long casement pipe; the flanges are made of ⅛-in. sheet iron welded on the drum, as shown in the illustration; the one end of the drum is equipped with a 2-in. wide brake; and the drum shaft is made of a piece of 1-in. round cold rolled steel with a crank on one end.

The whole drum assembly is set in a wooden frame. A ⅜-in. hemp rope is wound on the drum and threaded through a small pulley in the peak of the tripod. The sticks of 5- x 6-in. dynamite (equaling 25 lbs.) are hooked on the end of the rope and lowered by means of the brake. After the dynamite reaches the bottom of the hole it automatically unhooks itself and the rope is wound up again by means of the crank. The crank collar slides over the drum shaft and is only used when winding up rope. This machine cuts loading time about 30 percent. It was designed by the author and built by the quarry repairman, Peter Amadore.

Flow Distributor

By WALTER B. LENHART

WHERE SAND IS BEING SCREENED over a stationary screen, it is quite apparent that greater efficiency can be obtained if the flow of material is evenly spread over the surface of the screen.

Feeding the screen through a box having a perforated bottom is not satisfactory as the holes often become plugged with chips of wood or "sand up" thereby upsetting the equality of distribution.

A western operator uses a novel spreader made of 1-in. angle irons arranged as shown in the illustrations. The incoming sands flow through a 12-in. launder so as to create as little turbulence in the stream as possible. The stream of sand and water then cascades into the wide opening of the spreader, and is divided up into a multitude of smaller streams of equal extent. The spreader shown serves a fine screen that is 3 ft. wide, and fully 95 percent of the screen's area is effectively used.

The spreader is not nailed in place, but is simply allowed to rest on top of the screen although it could be securely fastened if desired. The same scheme is used at the same operation to divide the entire flow of sand and water up into four streams of equal size.

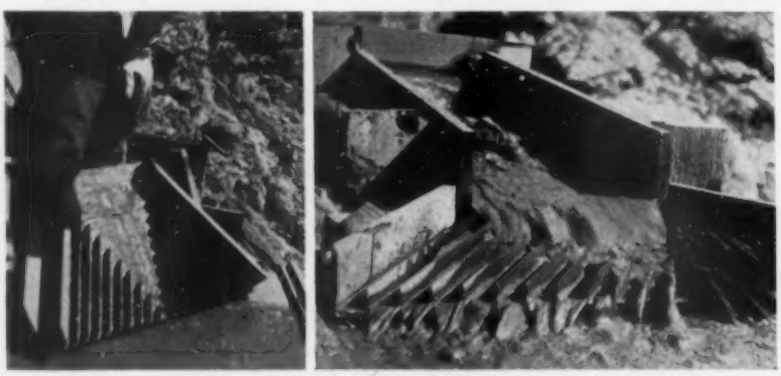
It will be noted that such a device cannot become plugged up readily, and if it does, the plugging is only momentarily. Also if a small runway becomes plugged, the splash is usually sufficient to allow most of the sand and water to go over the obstacle and therefore not to upset the equality of distribution.

Accurate Proportioning of Aggregates

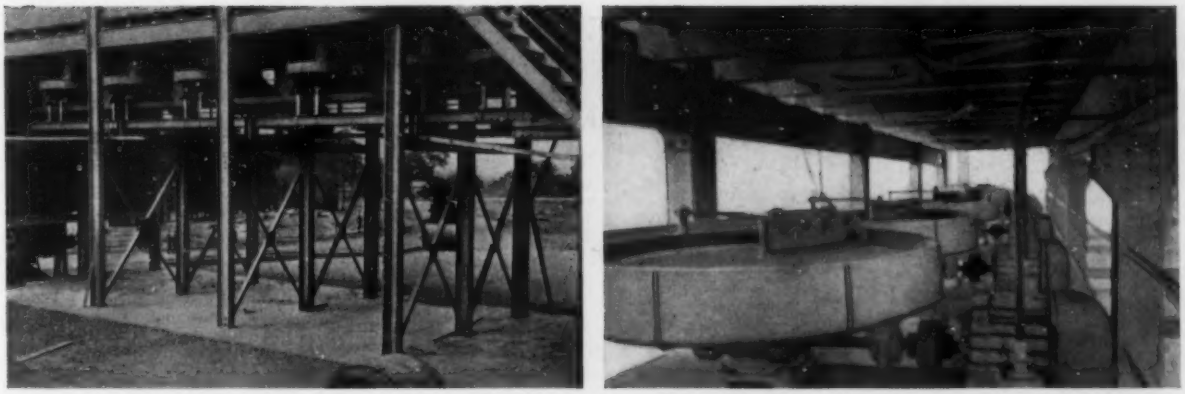
BLENDING various sizes of aggregates on a conveyor belt, under storage bins for shipment by rail or water is more or less common practice, but we have never noted any special devices to insure accuracy in the proportions of the various sizes as drawn from the bins, other than weighing batchers, used occasionally at some ready-mixed concrete plants Usually, the gates under the bins are simple sliding gates, or other types which can be full-opened or partly closed, thus proportioning the size of the stream of material fed to the belt.

A new crushed stone plant in Great Britain has been equipped to proportion the various sizes more accurately than the method referred to. According to a description in the *Quarry Managers' Journal* the device used is an adaptation of the well-known table feeder, quite universally used in the portland cement industry. The British writer in the *Journal* describes it as follows:

"It will be remembered that the Report on Experimental Work on the Roads 1935-36 stated that there was considerable difficulty in obtaining supplies of stone to reasonably close specification as regards grading and that it was even difficult to obtain bulk to the grading of samples supplied by firms as representing normal output. We were not aware



Left: Showing construction of sand spreaders. Right: Spreader in operation over stationary screen



Graders for accurately proportioning aggregates embody the principles of the table feeder used in the portland cement industry. Left: Side view, showing the conveyor beneath, onto which the graders discharge. Right: Close-up of the graders

that any machine was yet available for overcoming this difficulty and we were, therefore, particularly interested in these Clarmac graders which seem to offer a solution of a vexed problem.

"The graders are fed from the storage bins by means of a telescopic tube, which is adjusted so that the distance between its outlet and the table of the grader permits the stone to fill the table to its maximum capacity and no more. The circular table revolves slowly in the direction which carries the crushed stone to the cut-off knife, the position of the latter being adjustable. The knife is set at the desired point to give the required proportions, which will remain constant so long as the positions of the telescopic tube and the knife are unaltered. One of our illustrations is a close-up of the six graders beneath the Cairngryffe bins while in another, a side view of the graders is given, showing also the conveyor beneath, on to which they discharge.

"As each grader is manufactured as a self-contained unit, driven by its own motor, any desired number of them can be in operation together, according to the number of sizes of stone required for the particular aggregate wanted. Thus a wide range of combinations of stone sizes is obtainable, automatically and with certainty.

"These graders are push-button controlled from a panel on the tar mixer platform, conveniently situated to enable the attendant to control the supply of materials he requires. Pilot lights placed above the push buttons indicate to him the graders which are in operation.

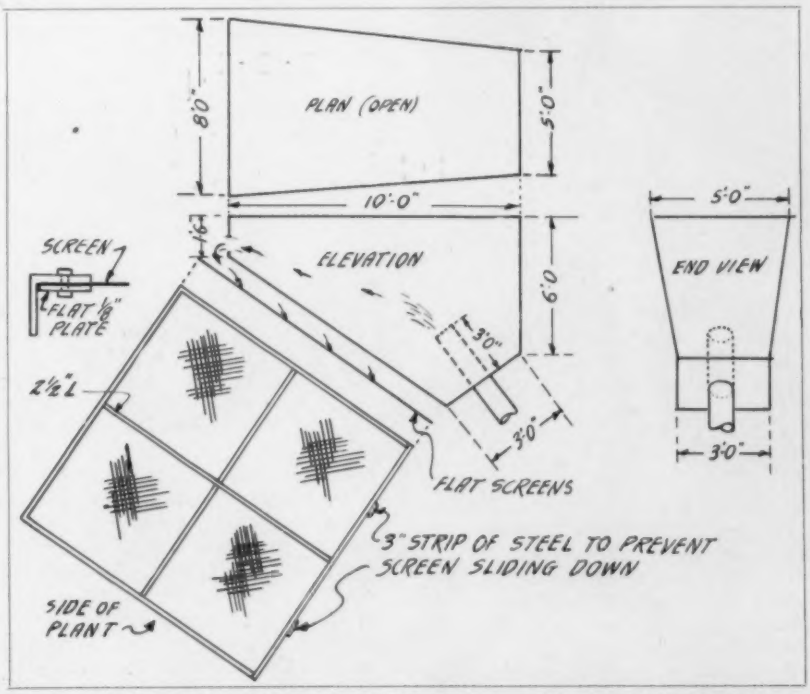
"At the end of the conveyor, the graded aggregate discharges into a hopper, out of which it falls on to an oscillating feeding table, designed to give a regular feed to the dryer. The dry stone is discharged from the dryer into two 20-ton hoppers on the top floor of the tarmacadam plant."

Flat Screens Easily Changed

A Southern sand and gravel company installed a delivery pan for the 10 in. pump discharge which seems very unique. The company also has a way of rigging up their flat screens which is simple and facilitates changing them.

A 10- x 10-ft. screen is used but is made in four 5- x 5-ft. sections each with its edges bolted to a 1- x 1- x ⅛-in. angle iron. The opening the screens fit over is slightly less than 10 ft. square, permitting a slight overlap. A 2½ in. angle iron is laid across in one direction only as a center support. The screen units just touch at the center and the sides of the plant. To change screens a hook is used to lift one up and another is laid down.

The ¼-in. delivery pan, open at the top and left, as indicated in the accompanying diagram, in operation is full up to the level of discharge at all times. Instead of the material pouring with great impact on the screens, it just surges out evenly and uniformly and makes for slow movement down the screen with good screening results. The pan is mounted on beams on the main structure just above the screens.



Top, side and end views of ¼-in. delivery pan and flat screens. Discharge from dredge at lower right of elevation view must pass out opening at top and left, causing uniform movement on through screens below without impact

NEWS ABOUT PEOPLE

WILLIAM C. MCBURNEY has succeeded the late A. L. Brownlee as general manager of the Yuba River Sand Co., Marysville, Calif. He was formerly superintendent of the company.

•

BEN W. CALVIN'S portrait arrived too late for the September issue, in which we announced his appointment

Ben W. Calvin

as president of the Aetna Portland Cement Co., Bay City, Mich., so we are reproducing it herewith.

•

W. H. WALLACE, formerly secretary-treasurer of the Wallace Stone Co., Bay Port, Mich., has been appointed president to succeed his brother, who is retiring because of ill health. G. A. Carrington has become secretary-treasurer of the company.

•

M. L. JACOBS, formerly general manager of limestone properties of the raw materials division, Bethlehem Steel Co., Bethlehem, Penn., has been appointed assistant to Vice-President, C. A. Buck. J. P. Peacock, formerly superintendent of the Bridgeport quarry succeeds Mr. Jacobs; and Hubert Merryweather has been appointed general manager of ore properties.

Mr. Jacobs, a graduate of Lehigh University, entered the employ of Bethlehem in 1916, as superintendent of quarries. In 1920 he became manager of quarries and in 1934 general manager of quarries.

Mr. Peacock, a graduate of Princeton University, joined the company in 1917 as superintendent of the Steelton quarry, in 1924 became superintendent of the Bethlehem quarry, and in 1938 was appointed superintendent of the Bridgeport quarry.

•

COLONEL L. J. BOXLEY, president of W. W. Boxley and Co., Roanoke, Va., has been awarded the Thomas Nelson Page medal for distinguished alumnus service to Washington and Lee University.

•

JOHN C. GRABER has been appointed a member of the South Dakota state cement plant commission to succeed Tom H. Johnston, whose term has expired.

•

LOUIS WARE, now president of United Electric Coal Co. has been elected president of International Agricultural Corp., New York, N. Y., to succeed the late John J. Watson. It is understood that Mr. Ware will resign as president of United Electric Coal and probably assume the position of chairman of the board, devoting his full time to International Agricultural. Mr. Ware was born in Somerset, Ky., was graduated as a mining engineer by the University of Kentucky and received his early experience in the Kentucky coal mines. He then became interested in copper mining in Arizona and was with the Miami Copper Co. from 1923 to 1926. Then he became general superintendent of mines for the Anglo Chilian Nitrate Co. In 1929 he returned to the United States and did consulting work and for about five years was with the New York Trust Co. on various assignments.

•

(The obituaries appear on page 78)

ERNEST BROWNSTEAD has been promoted to the position of plant engineer at the Ironton, Ohio plant of the Alpha Portland Cement Co. Prior to his recent appointment, he had been located at the St. Louis plant. His father, F. C. Brownstead, has been superintendent of the Alpha plant in Ironton for a quarter of a century.

•

O. H. SEEGER has been appointed Columbus, Ohio, sales-service engineer of the Southwestern Portland Cement Co. to succeed Floyd F. Green, who resigned to devote all his time to campaign for mayor of the City of Columbus.

•

MARLAND WOLF has been appointed advertising manager of United States Gypsum Co., Chicago, Ill., succeeding F. R. Babcock, who has resigned. Mr. Wolf advances from the position of assistant advertising manager and sales promotion manager.

•

J. S. BAILEY, owner of the Concrete Manufacturing Co., Atlanta, Ga., who is doing a fine job in promoting the best interests of concrete masonry in his community, has been concrete-minded ever since his college days. Mr. Bailey is a graduate of Cornell University and spent a number of years out of the Atlanta office of the Portland Cement Association in concrete highway work. That affiliation dates back to 1914 and again to 1926. In talking to him about concrete masonry and observing his enthusiasm we are inclined to believe his hobbies to be work and more of it. Mr. Bailey's plant was described in ROCK PRODUCTS for August, p. 79.

J. S. Bailey, on right, and Roy W. Darden, in charge of plant operations, Concrete Manufacturing Co., Atlanta, Ga.

CONCRETE PRODUCTS AND CEMENT PRODUCTS

Concrete Masonry Producer Builds a Home

Home of M. A. Arnold, president, Arnold Stone Co., constructed with concrete joists and floors, and concrete masonry walls

BIG MAJORITY FOR BESSER

BESSER PLAIN PALLET CONCRETE BLOCK MACHINES SERVING THE NEW YORK METROPOLITAN AREA.

Name	Number of Machines
Bedford Hills Concrete Products Corp.	1
Sidney Quinby	2
Hudson Concrete Block Co.	1
Mahlstedt Materials, Inc.	1
National Brick Corp.	2
Forest Hills Concrete Block Co.	3
George H. Krier	2
Picone Bros.	1
William Plander	2
Rockland Concrete Sales Co., Inc.	1
Builders Materials, Inc.	1
Amabile Bros.	1
Multiplex Concrete Co.	4
Hud-Cin Building Products, Inc.	2
Nick Mazzochi	1
Union Block Company	1
S. A. McCune Block Co.	1
Perry & Ruck	2
George H. Salmon Co.	1
Ogden & Cadmus	1
N. J. Materials Co., Inc.	1
Frank Lanza	1

TAMPERS
BESSER PLAIN PALLET STRIPPERS
VIBRATORS

BESSER TAMPER STRIPPERS

Besser Super Automatic Plain Pallet Stripper — Daily Capacity 3000 to 4000

Besser Victory Automatic Plain Pallet Stripper — Daily Capacity 2000 to 2500

Besser Semi-Automatic Plain Pallet Stripper — Daily Capacity 1200 to 1500

Besser Champion Power Operated Plain Pallet Stripper — Daily Capacity 1000 to 1200

Besser Multi-Mold Hand Operated Plain Pallet Stripper — Daily Capacity 250 to 350

BESSER VIBRAPAC PLAIN PALLET STRIPPERS

Besser Automatic Vibrapac Plain Pallet Stripper — Daily Capacity 4000 to 5000

Besser Power Operated Vibrapac Plain Pallet Stripper — Daily Capacity 2000 to 2500

BESSER-FLAM VIBRATOR

Besser-Flam Plain Pallet Vibrator — Daily Capacity 800

West of Rockies address inquiries about this machine to:
STEPHEN FLAM, SHERMAN OAKS, CALIF.

Ask for folder "21" Advantages of Plain Pallets. Write today for details and prices. State daily production and sizes you want.

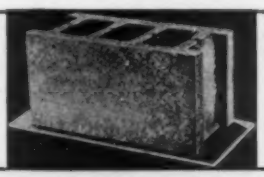
BESSER MANUFACTURING CO.

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL, HOBBS, UNIVERSAL, PORTLAND

210 39TH STREET **ALPENA, MICHIGAN**

FULLY PRESSED TOP Concrete Blocks



Made Only On BESSER Plain Pallet Strippers

EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER

Find New Uses For Cast Stone

Wide variety of architectural concrete products and Arnold Stone Co.'s merchandising methods which display new applications build up substantial business

By BROR NORDBERG

CONSISTENT high quality and diversification of products are two fundamental business policies followed by the Arnold Stone Co., Inc., of North Carolina, headed by M. A. Arnold, whom many know of as the energetic president of the Cast Stone Institute. Located in a thriving tobacco country, at Greensboro, N. C., Mr. Arnold is doing an enviable job of establishing precast concrete as an architectural building material.

His background covers many years' experience, for the Arnold family started a cast stone business in Germany in 1898. In 1909, the business was transferred to Canada and later, in 1916, to Jacksonville, Fla. Much cast stone was sold in the states north of Florida so, 11 years ago, a branch plant was established at Greensboro. Depression years forced the abandonment of the Florida plant and all activities are now centered at Greensboro.

Makes Variety of Products

Architectural cut cast stone was the only product manufactured during the early years and it still is the main one, but several other products have been developed in recent years. The principal ones are precast concrete floor joists, precast concrete floor slabs, Wilbert asphalt burial vaults, lightweight roof slabs, garden furniture, Superock building blocks and mosaic cast stone. Arnold and "Arnco Products" enjoy a wide and favorable reputation, which simplifies the promotion of all lines. Mr. Arnold and J. H. Schlag, vice-president, handle all sales personally.

In Greensboro and other southeastern cities are many outstanding structures utilizing "Arnco" cast stone in a wide variety of colors, surfacings and effects of architectural treatment. A few of these buildings are illustrated herewith as well as the manufacturing processes the individual pieces go through. Most of the surfaces, which are produced face down in the molds in the conventional manner, are of colored aggregates and crushed granites and marbles in a wide variety of colors. Mixing of the concrete is done in three Blystone mixers and it is tamped into the molds by pneumatic hammers, which is a practice now coming into wide favor throughout the country. Other air-operated equipment does the grinding of the surfaces and polishing. Handling of finished pieces is done by an overhead chain hoist on a monorail. Mr. Arnold, who a year ago went to Europe and studied practices there and reported on his observations at the most recent convention of the Cast Stone Institute, believes that mosaic stone is destined to find widespread use, and that there is already a trend in that direction. There are unlimited possibilities in colors and texture effects with the surface rough-textured by a brushing and acid treatment which accentuates individual particles and colors on the surface. (The surface, as noted, is made face down.) Some of this type of work is now being done by Mr. Arnold.

Left, E. A. Wuensche, superintendent, and M. A. Arnold, president

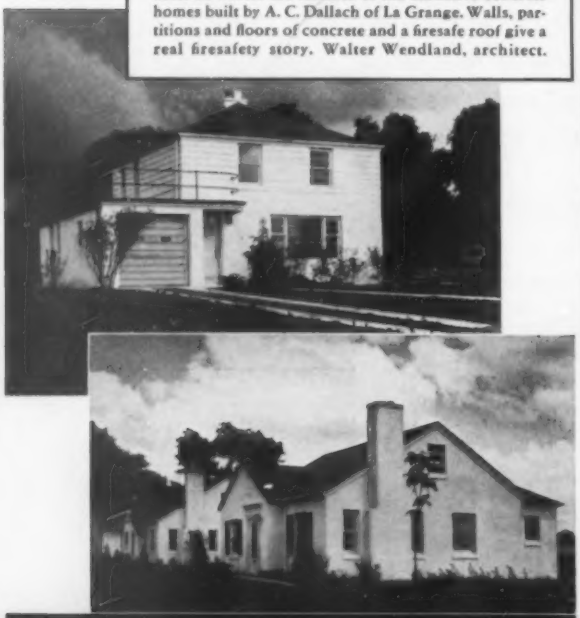
Interior of Arnold Stone Co. office, showing concrete masonry walls, and joist-slab ceiling. Note how ceiling is painted to simulate a French walnut wood. This effect is obtained by giving it two primary coats followed by a finish coat of a mixture of cheap beer and burned umber stipled with a brush

Precast Concrete Slabs

Light-weight aggregates, in this case Superock blast furnace treated slag, are used in the manufacture of building units, joists and slabs, which were first made in 1936 and which thus far have reached a sales volume of 50,000 sq. ft. annually.

These units are original in design, light in weight, standard in dimension and have wide application because they may be placed on bar

Cool comfort in summer and exceptionally low heating costs in winter are features of the attractive concrete homes built by A. C. Dallach of La Grange. Walls, partitions and floors of concrete and a firesafe roof give a real firesafety story. Walter Wendland, architect.



Another "case history" proves the sales appeal of CONCRETE

A. C. Dallach of La Grange, Ill., *features "Wearproof" Concrete Homes . . . and chalks up 32 house sales to date this year!*

Alexander Dallach figured the public was waiting for good-looking homes that embodied the latest construction methods, and assured lowest possible operating and maintenance costs. He studied the market, studied materials and methods—and *specialized in concrete.*

Working with an architect, Mr. Dallach developed four basic home designs and then launched a vigorous sales campaign. Prospects liked his plans, liked his construction ideas, and *liked concrete.* So—32 of them contracted for new homes this year—and the total may be 40 or more before the year is out.

There's a Ready Market in Your Community

Concrete products manufacturers, concrete contractors, home builders and realtors repeatedly have proved the profit possibilities in staging a joint drive for concrete homes. The procedure is simple: Get an attractive design . . . build a demonstration home . . . feature the beauty and comfort, the firesafety, long life and economy of concrete in sales and advertising.

PORTLAND CEMENT ASSOCIATION
Dept. A10-45, 33 W. Grand Ave., Chicago, Ill.
A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work.

"COMMERCIAL" CORED PALLETS

will help get the highest production at lowest cost, year in and out.

The large percentage of air space in Commercial Pallets allows quicker curing.

Pallets are ready for re-use sooner than other types.

Cost is low when production and life are considered.

Get the figures on various pallets and price of machinery before you buy, then you will see why they are best.

Tell your equipment dealer you want

COMMERCIAL CORED PALLETS

or write us.

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO

LOW INITIAL COST
LOW MAINTENANCE COST

ONE OF OUR MANY DESIGNS

Chase "all steel" Block racks are built to suit your individual requirements. Our experience and engineering will give you a rack with the proper dimensions and arrangement for loading your product and the proper under clearance to work with your lift truck.

WRITE for Catalog and Special Low Prices

Complete line of concrete block cars, decks, Lift Truck Racks, transfer cars, turntables, dump cars, etc.

CHASE DRYER CARS & TRANSFER CARS
CHASE FOUNDRY & MFG. CO. COLUMBUS, OHIO

joists and steel I-beam construction as well as on concrete joists for the construction of schools and industrial buildings of all types.

The slabs are 2½-in. thick, 1 ft. 3 in. in width and up to 6 ft. maximum length, and of tongue and groove design. The interesting and original feature of the slabs is that they have a structural strength for carrying a uniform load of 150 lb. per sq. ft. and yet are nailable for the application of shingle topping or roofing tile on the upper surface. This is accomplished by placing a 1½-in. thickness of structural reinforced concrete in the mold and superimposing over it a 1-in. thickness of lightweight nailable concrete, all being done in one operation while concrete is wet.

The underside reinforced concrete is designed to carry all the load. This concrete must be dense and is placed by an air hammer. The nailable layer, of Superock cellular aggregate, is placed to preserve its cellular characteristics by pouring it and is finished by troweling. This mix, with a ⅜-in. top-size aggregate, contains a greater percentage of the coarser fractions than is usual in manufacturing a lightweight, load-bearing concrete block, to enhance its nailing value so that copper nails may be embedded securely in it. The gradation and the method of placing are of utmost importance in producing that type of concrete. The slabs weigh about 22 lb. per sq. ft. and the underside of each is sometimes made with a finished surface if they are to be left exposed.

Concrete Block Have Smooth Faces and Edges

Lightweight concrete blocks of Superock aggregate were first made in 1937, using some natural sand as fine aggregate. This part of the business is still in the development stage, so equipment was installed for a modest output. A Stearns 12-cu. ft. mixer and Multiplex hand-operated stripper comprise the equipment. A Multiplex vibrator attachment for the block machine was later placed in operation, shortly after that type of equipment was made available. Capacity is about 500 of 8- x 8- x 16-in. units daily, practically all of which are sold for exposed work.

Here again, Mr. Arnold's artistic sense comes to the front in a variation of the ordinary-run of interior decorative construction. If a smooth-faced unit is desirable, he has provided a portable carborundum machine to smooth off rough faces and edges for that type of work. The practice is to run the grinding surface over the blocks in stockpile just ahead of the loading operation. At times color is applied, either on the surface or by mixing appropriate mineral oxides integrally into the concrete.

Demonstration at home show consisting of a corner of a concrete house with two 4-in. thickness and 1-in. air space in walls, cast stone sill and jambs, floor slabs and concrete joists

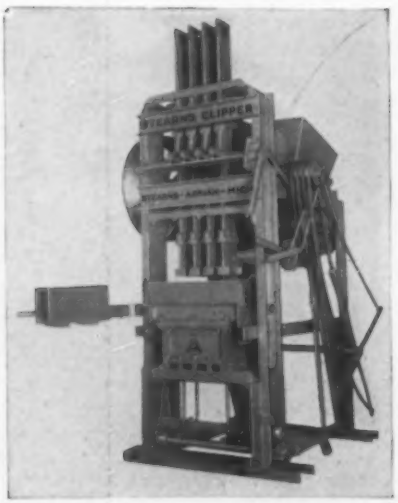
Garden furniture and allied ornamental work is but a small part of the business, but Mr. Arnold can point with pride to a number of outstanding special jobs he has done. Notable are the ornamental gardenware he manufactured for the du-Pont estate Italian gardens at Jacksonville, Fla., and other furniture made for a number of millionaires' homes.

Burial Vaults

In 1932, the company was licensed to manufacture the Wilbert asphalt and Monarch concrete vaults and has developed this end of the business to about 500 vaults annually. The vaults are manufactured under the patents of the Wilbert Haase Organization, using portable vibrators to place the outer concrete shell and various spray finishes. Aggregate consists of granite chips and natural sand, with a rich mix of about 1:2½ to produce a 6000 p.s.i. concrete at 28 days. Their sale is through funeral

Left: Handling a cast stone piece to the polishing machine. In the background are molds for making the precast units

Right: Portable carborundum machine used to smooth block faces for certain kinds of interior exposed work



"ANCHOR"

Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for plants and revamping of old ones for more economical service.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers, Stearns Joltcrete, Stearns mixers, pallets, Straublox Oscillating attachments, etc.

Repair parts for Anchor, Ideal, Universal, Stearns, Blystone mixers and others.

Anchor Concrete Mchy. Co.

G. M. Friel, Mgr. Columbus, O.

directors exclusively but the Arnold company delivers and services each sale that is made.

Cement Purchases

High early strength cement is used for all work, since yard storage is somewhat limited and early year removal is desirable. Mr. Arnold, as an individual, typifies some of the large buyers of cement in that he has made a study of cements and their properties and has set certain standards to be met. As an example, he requires that an autoclave test be made on all cements.

Merchandising

Certain effective ways are used to show the pleasing results which may be realized with precast concrete. The office, for example, is a splendid exhibit of concrete construction, using exposed lightweight blocks laid in random pattern, precast joists and slabs. The accompanying photograph of the office illustrates how the ceiling may be stippled to imitate a beautiful French walnut, which is bound to impress people with the architectural possibilities of concrete and actually has deceived a number of people into thinking the ceiling was of wood.

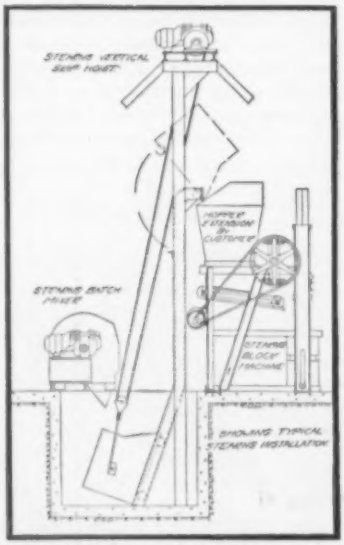
Mr. Arnold's home is another outstanding example of what may be done in concrete. Its construction consists of concrete joists and floors, concrete masonry walls, a concrete basement and cement-asbestos shingles. This type of house, says Mr. Arnold, commands the lowest fire insurance rate in Greensboro. These rates are based on $1.98 per $100 value.

Other illustrations herewith show how effectively an individual company may display its products and details of usage to the public without the prohibitive cost of building a complete model home. A corner of a house, on display in 1938 at the Greensboro Home Building Show sponsored by F.H.A., shows a double wall of 4-in. Superock units with a 1-in. air space between, a precast floor and joist construction, cast stone sills and jambs, cast stone ventilators and even samples of the aggregates and cement used. This display probably would reveal more to the prospective buyer at a glance than could be shown him in any other way.

Operations at the plant are under the supervision of E. A. Wuensche, who has been with the company for over 20 years.

Stearns Clipper makes faced blocks at low cost

—readily converted for stripper blocks



Complete Concrete Products Plant Equipment—Power Strippers, Clipper Strippers, Mixers, Skip Loaders, Brick Machines, Manhole Block Machines and Straub Oscillating Attachments.

Here's a low-cost down-face machine for the production of building blocks with special facing material—plain, rock, panel and other designs, in fulls, fractionals, single and double corner, for 4, 8, 10 and 12 in. wall thickness.

Substitution of different mold box, tamp feet and stripping device converts the machine to a stripper.

Write for complete details and price of this general-purpose machine.

Six Important Features

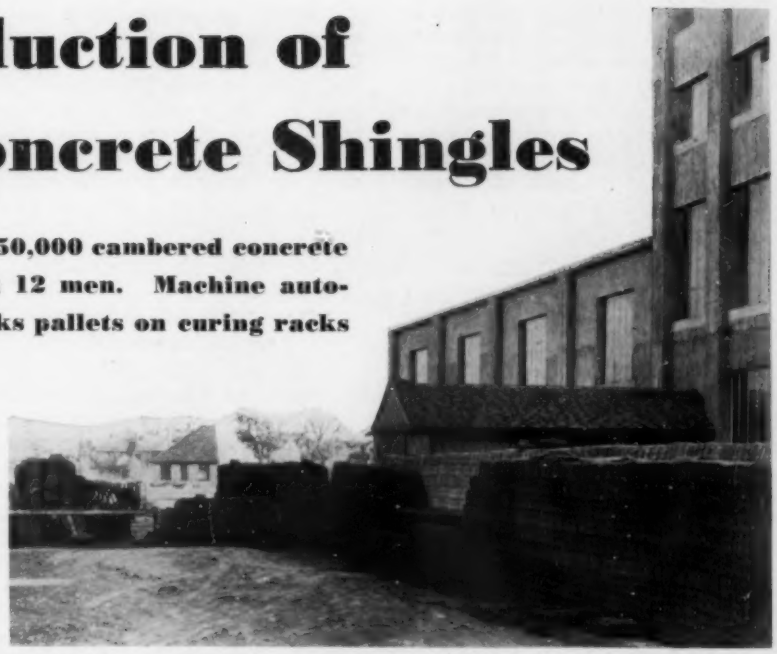
Rigid end mold box—welded steel construction—large air-space cores—quick acting finisher plate—"pull easy" core operating device—alternate 8-bar tamping.

STEARNS
MANUFACTURING CO. - ADRIAN, MICH.
GENE OLSEN, PRESIDENT

While still one of the leading producers of tamp equipment, Stearns is also a pioneer in vibrating block machines—manufacturers of Stearns Joltcrete, fully protected by patents issued and pending.

Mass Production of Concrete Shingles

British plant manufactures 50,000 cambered concrete shingles per 8-hr. day with 12 men. Machine automatically removes and stacks pallets on curing racks



Exterior of concrete tile plant. Note tile stacked in storage and conveyors to move the finished product to the yard

THE CAMBERED CONCRETE SHINGLE, or more accurately tile," was introduced in the United States by an enterprising West Coast operator, A. G. Streblow, Basalt Rock Co., Napa, Calif., about two years ago. As a result of a trip abroad Mr. Streblow bought the necessary machinery and equipment and secured the services of an expert to begin manufacture. His plant was described and illustrated in the February, 1939, issue of ROCK PRODUCTS, pp. 63-65, 69. Since then the editor has learned that these shingles are common in the British Isles and that other manufacturers of machinery make similar equipment. One of these, Pegson, Ltd., Coalville, Leicestershire, England, makes a more automatic or mechanized plant than that described in our February issue.

At the Napa, Calif., plant the pallets were removed and stacked by hand. At the Pegson-Wilkinson plant illustrated and described herewith, even the removal of the loaded pallets and their stacking in the curing rack is done mechanically by an ingenious device. W. L. James, of Pegson, Ltd., has recently been in the United States and very possibly some of our readers have heard something of this new machine.

Features of Cambered Shingle

The advantages of this type of tile or shingle are mentioned in the previous article. Because of their camber, or curvature, there is but a *line* of contact between overlapping shingles instead of a flat *area* of contact as in the ordinary shingle, whether it be wood, slate, asphalt, or concrete. Therefore there is no capillarity or creeping upward of water on the underside of the shingle. This makes a surprising difference in weatherproofness, as Mr. Streblow has demonstrated in severe tests of wind-blown rain.

The English plant is described as follows:

When concrete tiles are produced it is essential that every care be taken to obtain a uniformity of mix if the tiles are to be of uniform strength. In the Pegson-Wilkinson tile plant, the proportioning of the aggregate, cement, color and water is extremely accurate and the tiles produced are of greater strength than that prescribed by the British Standard Specification.

An interesting installation on the edge of the Cotswolds, near Chopping Sodbury, Gloucestershire, is producing 50,000 concrete tiles per 8-hour day, utilizing only 12 operatives—manual labor being reduced to a minimum. The aggregate, which consists of stone dust from an adjacent quarry, is delivered to the plant, washed, screened, and conveyed to the upper story where the material is discharged into the main aggregate hopper, from which it is drawn as required by the proportioning plate situated above the concrete mixer. [By proportioning plate is evidently meant what we term a cable feeder, commonly used in cement plants to feed tube mills.—Editor.] The aggregate conveyor serves several purposes, being used also for topping sand and as a sack conveyor for color and cement. When cement sacks are conveyed to the upper story a swinging chute is brought into position, the sacks being delivered to a convenient point for discharging into the cement hopper on the floor below. The color and sand for topping the tiles are also brought to the upper story on the same conveyor and discharged where required.

Preparing the Mix

The topping sand may be fed through a sand burner (dryer) and passed directly to the 4-compartment storage hopper, or alternatively, by way of a proportioning plate directly to the color mixer on the second floor.

A color mill grinds cement and color, the product being discharged by way of a chute on to the proportioning plate already mentioned, which feeds the color mixer. To facilitate the handling of a variety of topping mixtures the color mixer has four discharge points, to three of which removable plates are fitted. From these discharge points the mixture flows into any one compartment of the 4-compartment hopper situated on the mixing floor.

The other chutes above the concrete mixer deliver the appropriate amount of cement and color to the mixing table. The latter is supported by four trunnion rollers carried in ball bearings and is driven by a central shaft through a reduction gear box. The proportioning plate for the aggregate feed is direct driven from this central shaft which extends into the aggregate hopper, agitators being fitted to the upper end of the shaft to ensure continuity of feed. An enclosed gear box contains the drives for operating the proportion-

ing plates for color and cement. The aggregate, cement and color chutes are circular and an adjustable sleeve at the lower end of each chute enables a primary proportioning to be obtained, the final proportioning being effected by an adjustable scraper which delivers the material through small chutes directly to the mixing table.

The Mixing Table

A series of adjustable curved blades direct the material in a spiral path from the center of the mixing table to its periphery. Opposite to the delivery chutes is a heavy kneading roller carried by a swivelling arm, together with an independently driven mixing star rotating at high speed . The aggregate, cement and color passing directly under the roller and through the path of the star at least twice, are thoroughly and uniformly mixed. Discharge is effected at two points on the periphery of the mixing table by adjustable plates fitted for push-pull control from the tile machine platform on the floor below. The mixture falls into the mortar box on the tile machine at approximately the rate demanded by the machine; the pallets passing in an unbroken stream underneath carry the mixture to the compression units where the tiles are formed. The tiles are then cut, the topping applied, and nail holes punched before the pallets with tiles emerge from the tile machine to be carried by the feed conveyor to curing racks.

The pallets, each one with its pair of tiles, are carried along in a steady stream and pitched evenly apart until they meet the "ram." The ram is mounted on three rollers which run on steel tracks extending the full length of the maturing racks and means are provided for locating the ram at each operating position. The maturing racks are arranged in pairs in such a manner that when one of a pair of racks is at the top, the other is at the bottom of the rack structure. Each rack consists of 50 trays and each tray carries 8 pallets, so that the capacity of a pair of racks is 800 pallets with 1600 tiles.

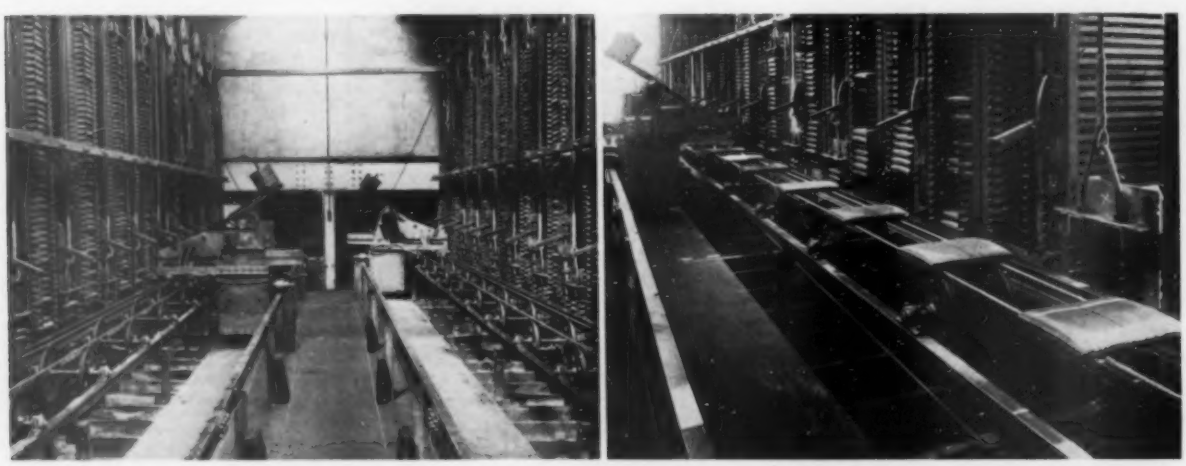
"Ram" Transfers Pallets to Curing Racks

As the pallets approach the ram, the first pallet operates a gate which closes behind it and forms a locating stop for the second pallet. The second pallet operates a switch just before reaching the locating stop, and the forward stroke of the ram begins just when the locating stop has been reached, the two pallets each with its two tiles being pushed gently into the rack trays. A quick return stroke brings the plungers back before the next pair of pallets has been positioned and again a pair of pallets is pushed in. After eight such operations, in which 16 pallets carrying 32 tiles have been pushed into the racks, the rack operating gear on the ram automatically comes into operation—one rack being raised and the other lowered, bringing another pair of trays into the charging position. This motion is synchronized between two charging operations, so that there is no interference with the continuous charging of the pallets from the time one pair of racks is started on until it is finished. The ram is then moved one stage forward to fill the next pair of racks, when charging again begins.

Since the maturing racks are always loaded to full capacity the arrival of two pallets with fresh tiles displaces two pallets with their complement of tiles which have been maturing in the racks for 24 hours. The two pallets carrying their tiles slide simultaneously on to a conveyor at the discharge side of the racks, which carries them over the automatic "depalleter." At this point a man is stationed, picking the tiles off the pallets and placing them on a dipping conveyor, which carries the tiles through a dipping tank to the stacking yard. The pallets meanwhile are carried on by the return conveyor, pass through an oil spray, and without being touched by hand enter the magazine of the automatic feeder of the tile machine to be recirculated. One man can remove 25,000 tiles per day from the pallets without undue fatigue.

Since the ram is brought to each pair of racks in the same sequence each day, each tile ejected from the racks has had exactly 24 hours in which to mature. Thus, by a very close control of maturing period, and a similar control of mixing operations, a very uniform product is obtained.

In recent years there has been in Great Britain a vast change in materials used for roofing. While at the beginning of the century slates predominated in certain areas, clay tiles in others, and in the rural districts thatching was general, today a variety of materials is employed. Concrete tile which, by reason of its durability, its pleasing appearance and its inexpensive first cost, is fast replacing other types from public favor. They can be manufactured in any color desired, and the color is permanent, any weathering merely adding to their beauty. Concrete tiles also become stronger with age.



Left: Machinery for removing pallets loaded with "green" tile and stacking them in curing racks. Cured tile are automatically pushed onto a conveyor at the discharge side of the racks. Right: Closeup of mechanical ram for stacking tile

YES SIR! A CHEAPER WAY OF PRODUCING CONCRETE BRICK

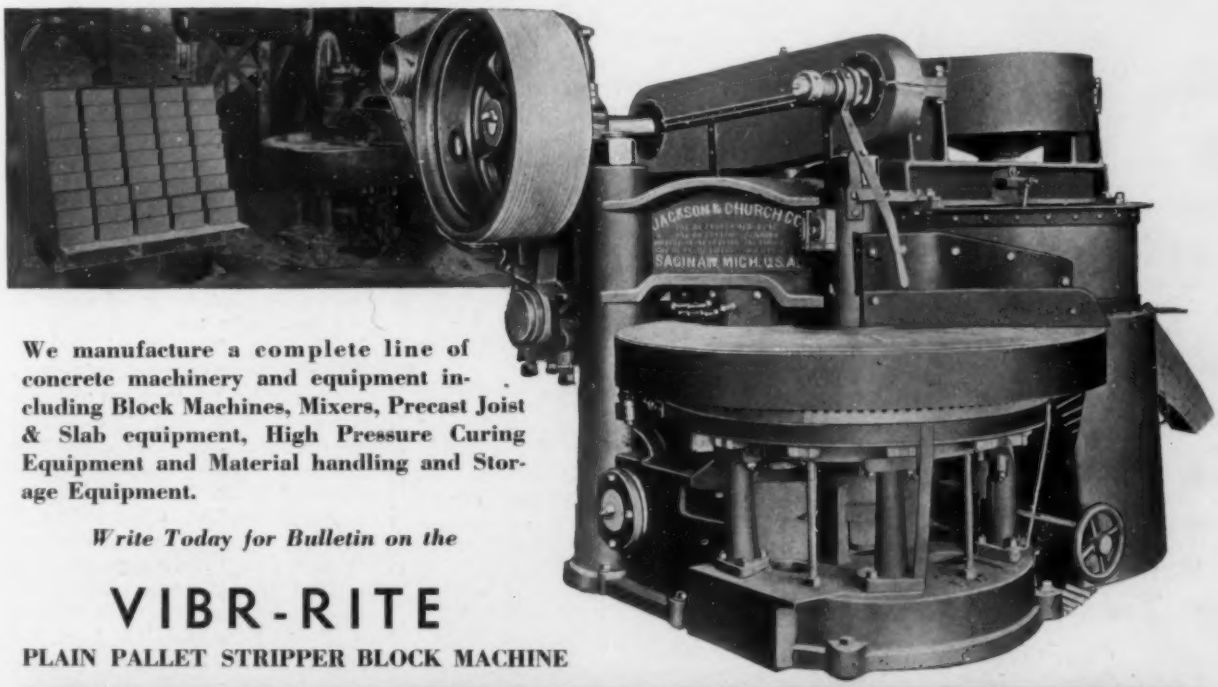
LEANER MIXES . . . .
HIGHER STRENGTHS
LOWER ABSORPTION
NO PALLETS NEEDED

A process and equipment that has been used for over thirty years in the manufacture of sand lime and concrete brick. The JACKSON & CHURCH brick machines will enable you to produce concrete brick at a cost that will give you a good profit in today's highly competitive markets. Well built, low maintenance cost, high production and simple to operate.

Positively NO PALLETS are used as the brick are taken right from the machine and stacked on top of each other on to flat deck cars or racks. All brick are accurate in size, of smooth texture with clean sharp edges. Cinder, Haydite, Superock, Pottsco and other lightweight aggregate brick can be made on these machines.

Colored Concrete Face Brick can be made by adding the color to the mix or the brick may be sprayed after they are made. A large market is opening up in the low cost home field for this type of product. Why not tap this new source of profit by putting in a Jackson & Church Brick Machine in your plant. Write today for full information.

Model-"A" Brick machine will produce from 3000 to 3500 brick an hour
Model-"C" Brick machine will produce from 1500 to 1800 brick an hour



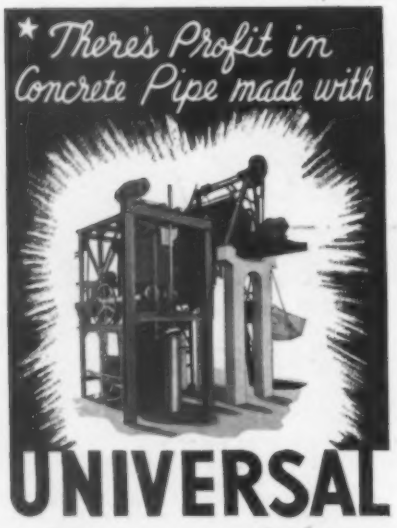
We manufacture a complete line of concrete machinery and equipment including Block Machines, Mixers, Precast Joist & Slab equipment, High Pressure Curing Equipment and Material handling and Storage Equipment.

Write Today for Bulletin on the

VIBR-RITE

PLAIN PALLET STRIPPER BLOCK MACHINE

SINCE 1881 **JACKSON & CHURCH CO.** SAGINAW MICH.



CONCRETE PIPE EQUIPMENT

More than 16 years' experience in the manufacture of concrete pipe equipment and concrete pipe is built into this machine. Every part is designed for a lifetime of trouble-free service. Makes every size from 6 inches to 48 inches, both bell-end and tongue-and-groove. Let us show you how you can build a profit-making pipe plant.

Send for catalog today.

UNIVERSAL
CONCRETE PIPE CO., Inc.
COLUMBUS, OHIO

- Vibration
- Pressing
- Uniform Density
- Trowelled Surfaces

Write for Information

KENT-ROOT VIBRA-PRESS

The KENT MACHINE CO.
CUYAHOGA FALLS, OHIO

California Masonry Association Discusses New Standards

CALIFORNIA Concrete Products Association held a meeting at San Jose, Calif., September 7, with an attendance of about 25 concrete products manufacturers, to formulate minimum standards for concrete masonry units for F.H.A. approval and to discuss merchandising.

The meeting was primarily for setting requirements in northern California but several southern California masonry producers were there. A. H. Winters, chief architect of the Oakland office of F.H.A., was a guest and figured prominently in the discussion of standards. Tentative minimum requirements had been drawn up and submitted to individual concerns before the meeting, with the result that practically all had suggestions and comments to make in a very lively, business-like session.

Purpose of the meeting was to arrive at some uniformity in requirements, to be submitted to builders, and to do so with the approval of F.H.A. In addition to a discussion of masonry unit properties, such as strength, moisture, curing methods, etc., considerable thought was given to structural details, reinforcing, placing of studs and other details made necessary by natural conditions in California, such as earthquakes. In spite of rigid requirements along these lines, considered totally unnecessary in other parts of the country, products manufacturers in California are going ahead to put concrete homes across.

Merchandising was considered from the floor, since it was felt that this part of the business was comparatively undeveloped. A. G. Streblow, president, Basalt Rock Co., Inc., Napa, emphasized that good masonry contractors must be developed in every city. In his experience he had found it of utmost importance to develop one good masonry contractor in each city who becomes sold and familiarized on concrete masonry and proper construction with these units. This, he said, is necessary to cut construction costs so that concrete masonry can in a true light be competitive with other types of construction. He added, further, that concrete masonry manufacturers were doing their share in developing prospects by demonstrations and advertising, and that a contractor must be made to realize this and coöperate accordingly.

Harold Chutter, Jordan Concrete Pipe Co., Fresno, said that the best sellers of concrete masonry, in his opinion, were the owners of concrete masonry homes properly built. The rest of the meeting was concerned with a discussion of methods of interesting builders, and how meetings would be held to help them, etc.

A. G. Streblow, president of the Association, presided. Mr. Chutter is vice-president and G. F. Steigerwalt, Portland Cement Association, San Francisco, secretary-treasurer. Mr. Chutter will be remembered as past president of the American Concrete Pipe Association and Mr. Steigerwalt for his previous activity out of the Chicago office of PCA.

Specifications for Concrete Houses

THE PORTLAND CEMENT ASSOCIATION, Chicago, Ill., has prepared some attractive illustrated specifications to help architects and builders write specifications for concrete houses. Drawings, pictures and explanatory notes distinguish these from ordinary specifications and emphasize important details of construction. The first three specification leaflets now available are: "Precast joist concrete floors with cast-in-place concrete slab," "Portland cement stucco on concrete masonry walls," and "Application of portland cement paint on exposed concrete masonry walls." Published in 8½- x 11-in. loose leaf form, the specification series when complete will constitute a construction manual especially helpful to builders. The series also should be helpful to concrete products manufacturers in making sales.

Molds and Forms

SEPTICRETE
PRECAST CONCRETE SEPTIC TANKS
A Good Market and Real Profits
Write for Details about Steel Forms
SUBURBAN SANITATION SYSTEMS CO.
Kingsville, Ohio—Fairhope, Ala.

Cement Colors

STAR and ANCHOR COLORS
Geo. S. Mepham Corp., East St. Louis, Ill.
C. K. Williams and Co., Easton, Penn.

FROM SAND-LIME TO CONCRETE

Changing character of deposit and demand for concrete products influences conversion from sand-lime to concrete brick

By RALPH S. TORGERSON

Ray C. Kiser, an old-timer in the business, is president of Crume Brick Co.

With the depletion of the high-silica content of its sand deposit and a trend toward the use of concrete products in the Dayton, Ohio, territory, the Crume Brick Co. decided to change over to the production of concrete in place of sand-lime brick.

No change was required in equipment, however, as the 12-mold Jackson and Church rotary press was continued in service for the manufacture of standard 2¼- x 8-in. brick. This machine, which was formerly used to make sand-lime brick, has a capacity of 3000 concrete brick, the same high rate which was maintained in the production of sand-lime units. No mechanical changes whatever were required.

A large glacial deposit of sand lies at an elevation a short distance back of the plant. Materials are transported to the plant by means of a 400-ft. slackline cableway excavator with a 9 cu. ft. Sauerman Crescent bucket drawn by a 25-hp. Sauerman hoist. The bucket dumps into a hopper feeding a belt conveyor, 100-ft. centers, which carries the material to a piano wire scalping screen set to reject plus ¼-in. Throughs are elevated to a short belt conveyor dumping into the sand bin. Rejects from the scalping screen go to an 8- x 15-in. Sturtevant jaw crusher and the entire product is then chuted directly to a 24-in. Symons disc crusher. Throughs from the Symons disc crusher go to the elevator leading to upper short horizontal conveyor, which dumps into the sand bin. Sand ranges from fines to ¼-in.

Mixing and Pulverizing

In preparing a concrete mix for the production of brick, the equipment formerly employed to make sand-lime units is used. Sand flows by gravity from the steel storage bin above to a Schaeffer poidometer which accurately weighs out the correct quantity of sand to a 10-ft. Jackson and Church rod mill. Simultaneously, the cement is dumped from bags into a hopper over another poidometer, formerly used in measuring out lime from the steel lime storage bin, not at present in use. The cement, after being measured out of the poidometer, joins the sand in the rod mill where it is intimately mixed and pulverized and water added by a hand-controlled valve on the pipe line. The resulting concrete mixture has a consistency of about molding sand. The amount of water added to the mixture is dependent upon the character of the sand aggregate being used. Some sands in certain portions of the deposit will hold more water than others.

After the concrete mixture has been in the rod mill a sufficient length of time it is discharged to a belt conveyor which leads to a hopper feeding the Jackson and Church rotary brick press.

Producing 3000 concrete brick per hour on 12-mold Jackson and Church rotary press formerly used to make sand-lime brick

Two men rapidly remove the "green" brick at the rate of 3000 per hr. as they are pushed up above the level of the rotating table. No pallets are required as the pressure of over 25 tons permits them to be handled without any damage, using reasonable care. The "green" brick are stacked on small trucks, operating over narrow gauge track and are transferred by turntables to a track at right angles to a battery of two 65-ft. and three 40-ft. hardening cylinders into which the loaded cars are run by the use of other turn tables in line with the cylinders.

In the hardening cylinders or autoclaves, the brick are subjected to a steam pressure of 125 p.s.i. for a period of 8 hr. The curing cycle is about 10 hr., allowing for time to build up pressure and to reduce it.

Concrete brick taken from the hardening cylinders and tested show

Load of cured brick being removed from hardening cylinder

a 2000 p.s.i. transverse breaking strength. This compares with 1100 p.s.i. for hard common clay brick. Moisture absorption of the concrete brick made by this process is from 8 to 10 percent as compared with up to 15 percent for common clay brick.

Standard cement, all passing 200 mesh, is used in making concrete brick. While the proportion of cement to sand used is comparatively low, the high molding pressures of the rotary press and the steam curing makes for a dense, fine textured, and strong brick, having uniform dimensions.

Concrete brick made by the Crume Brick Co. is used in buildings of all types, both residential and industrial. According to Ray C. Kiser, president, this concrete unit has become increasingly popular because the high pressure steam cured brick is dense and light in color and may be easily painted. The double brick and brick and a half sizes also are being used in larger quantities as they are cheaper to lay and require less mortar.

Buys Another Plant

GERALD F. CONROE, assistant general manager of the Bradford Building Block Co., Bradford, Penn., who also operates a concrete products plant at Emporium, Penn., has purchased the former plant of Chautauqua Cinder Block, Inc., at Falconer, where operations have been resumed after the lapse of nearly a year. The two-story plant was constructed in 1932, and was first occupied by the Jamestown Block & Tile Co. In 1936, Donald A. McClure reorganized the concern, which was then known as the Chautauqua Cinder Block, Inc. This company ceased operations in October, 1938. Seven men are now employed at the suburban plant which will soon be enlarged and new equipment installed.

Build Plant To Make Large Concrete Pipe

UTAH CONCRETE PIPE CO., Salt Lake City, Utah, has secured the contract for 69-in. pipe for Deer Creek dam near Provo, Utah. It is expected that on October 1 work will start on a new plant at Pleasant Grove which will be used in manufacture of the pipe. About 75 men will be employed in the factory.

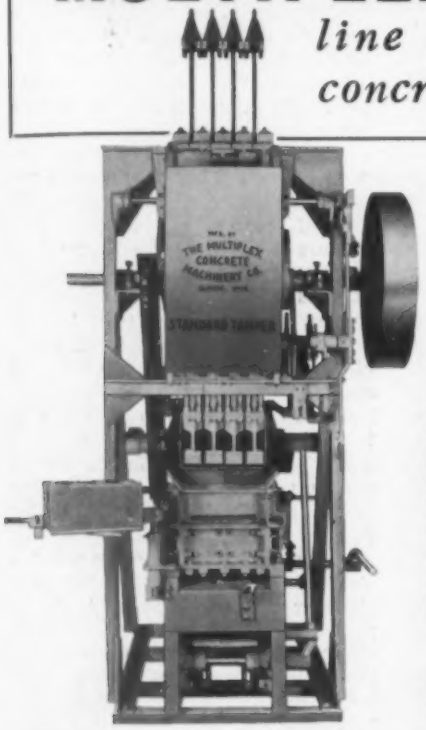
Ready Mix Concern Buys Gravel Property

CENTRAL PRE-MIX CONCRETE CO., Spokane, Wash., has acquired the Union Sand & Gravel Co., and is planning to modernize the plant, increasing capacity from 400 cu. yd. daily to 1000. Considerable new equipment will be necessary. Plans are also under consideration to increase their facilities for handling ready mixed concrete.

Adds Ready Mix

BLUE DIAMOND CORP., LTD., Los Angeles, Calif., large producer of aggregates and dealer in building materials, has during the year added ready-mixed concrete to its facilities. Six 4-cu. yd. Jaeger transit mixers went into service this past summer.

MULTIPLEX . . . *presents a complete line of equipment for the concrete products producer*

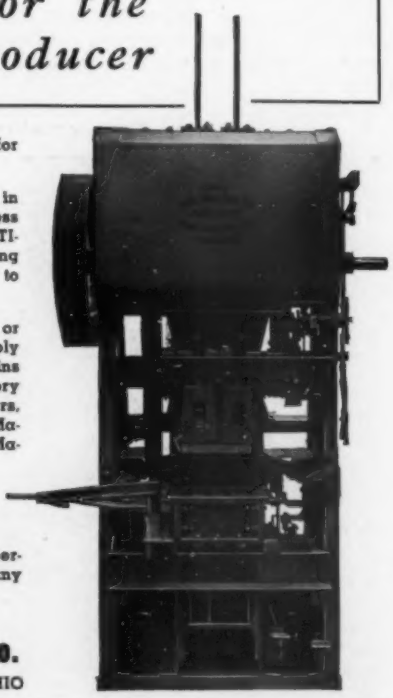


MULTIPLEX makes the ideal equipment for every concrete products purpose.

Neither time nor effort was spared in making this equipment to give faultless performance under all conditions. MULTIPLEX engineers have overlooked nothing that could add stamina or economy to concrete products operations.

Whether you want a single small unit or a complete plant, MULTIPLEX can supply your wants. The MULTIPLEX line now contains over twenty models with a machine for every purpose: Hand Machines, Double Strippers, Single Strippers, Tile Machines, Flue Block Machines, Random-Ashlar Machines, Brick Machines, Molds, Forms, Power Machines, Power Presses, Power Tampers, Power Strippers, Super Tampers, Mixers, Cars and Racks.

Be sure to check MULTIPLEX features, performance, and service before you buy any new equipment. Write for details.



Multiplex Concrete Machy. Co.

ELMORE . . . . . OHIO

Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of September 16:

Central

59288. Establish on (a) **sand**, industrial, in all kinds of equipment, C. L.; sand (except industrial) in closed equipment, C. L.; (b) **sand**, industrial, in all kinds of equipments, C. L.; (c) **sand** (except industrial) in open top equipment, C. L. (See Note 6), Joliet, Ill., to destinations in Indiana, Michigan, Ohio, Pennsylvania and New York, located in C. F. A. territory, rates based on formulae prescribed in I. C. C. Docket 22907 as follows: (Rates in Cents Per Net ton) Proposed Rates from Joliet, Ill.

To Rep. Destinations	(a)	(b)	(c)
Anderson, Ind.	187	206	149
Attica, Ind.	165	182	116
Bay City, Mich.	242	266	237
Benton Harbor, Mich.	165	182	127
Buchanan, Mich.	154	169	116
Buffalo, N. Y.	341	375	341
Cleveland, O.	264	290	264
Detroit, Mich.	242	266	237
Dowagiac, Mich.	165	182	127
Elkhart, Ind.	165	182	127
Evansville, Ind.	231	254	220
Fort Wayne, Ind.	187	206	149
Flint, Mich.	231	254	220
Grand Rapids, Mich.	198	218	160
Holland, Mich.	187	206	149
Indianapolis, Ind.	198	218	160
Jackson, Mich.	209	230	187
Kalamazoo, Mich.	176	194	138
Kokomo, Ind.	176	194	138
LaFayette, Ind.	165	182	127
Mishawaka, Ind.	165	182	116
Muncie, Ind.	198	218	160
Muskegon, Mich.	198	218	160
Pittsburgh, Pa.	319	351	319
South Bend, Ind.	154	169	116
St. Joseph, Mich.	165	182	116
Terre Haute, Ind.	187	206	149
Toledo, O.	220	242	204
Youngstown, O.	297	327	297

59314. Establish on (a) **limestone, agricultural** or ground, in box cars, C. L., min. wt. 60,000 lb. and (b) **agricultural limestone** (unburned in bulk), C. L., in open top cars, Durbin, O., to Jeffersonville, Ind., (a) 176c and (b) 160c per net ton via C. C. C. & St. L. Ry. direct.

59326. Establish on **stone crushed**, coated with oil, tar or asphaltum, (oil, tar or asphaltum not to exceed 10% by wt. of the commodity shipped), C. L., Chicago, Ill., to Michigan points, viz.: Cooper, 194c; Moline, 207c; Grand Rapids, Kinney, Sullivan, Muskegon, Belmont, Rockford, 219c; Stanwood, 232c; Big Rapids, 244c; LeRoy, 257c; Missaukee Jct., Section 10, 283c; Sandstown, Lake City, Falmouth, Michelson, 295c; Manton, 283c; Walton Jct., Mayfield, 295c; Traverse City, 308c; Crofton, 295c; Thelma, 308c; Walloon Lake Station, 320c; Harbor Springs, Pellston, 333c; Mackinaw City, 345c per net ton.

59328. Establish on **limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., Ridgeville, Ind., to Donora, Ellsworth, Cokeburg, Marianna, Penn., 259c; Lake Lynn, Penn, 281c; Unity Jct., Russellton, Fayette City, Penn., 259c; Brownsville, Penn., 281c; Logans Ferry, Scenery Hill, Penn., 259c; Jerome, Penn., 292c; Barking, Bentleyville, Penn., 259c; Clarksville, Isabelle (Fayette County), Connellsville and Uniontown, Penn., 281c per net ton.

59345. Establish on **sand**, industrial, or C. L., Dundee, O., to Walkerville and Windsor, Ont., 237c per net ton.

59395. Establish on **sand** (except industrial), and **gravel**, C. L. (b) **Crushed stone and crushed stone screenings**, C. L., to Nokomis, Ill., from Kern and Terre Haute, Ind., 97c per net ton on sand and gravel; Greencastle, Ind., 97c per net ton on crushed stone, etc.

59399. Establish on **crushed stone**, in open top cars, C. L., from Hillsboro and New Vienna, O., to various pts. in Ohio, Pennsylvania and West Virginia. Proposed Rates in Cents Per N. T. From Hillsboro, Ohio, "A" and from New Vienna, Ohio, "B" to: Charleston, W. Va., "A" 165, "B" 165; Parkersburg, W. Va., "A" 160, "B" 138; Pittsburgh, Penn., "A" 209, "B" 198; Weirton, W. Va., "A" 198, "B" 187; Wheeling, W. Va., "A" 182, "B" 171; Akron, O., "A" 182, "B" 171; Ashtabula, O., "A" 204, "B" 193; Bellaire, O., "A" 182, "B" 171; Cadiz, O., "A" 182, "B" 171; Canton, O., "A" 171, "B" 160; Cincinnati, O., "A" 99, "B" 99; Cleveland, O., "A" 182, "B" 171; Dayton, O., "A" 110, "B" 105; Marietta, O., "A" 160, "B" 138; Steubenville, O., "A" 182, "B" 171; Toledo, O., "A" 171, "B" 160; Kenwood, O., "A" .., "B" 171; Strongsville, O., 'A" .., "B" 171.

59431. Establish on **crushed stone** or **crushed stone screenings**, in bulk, in open top cars, from Lima, O., to Belle Centre, O., 77c per net ton.

59477. Establish on **slag**, crude (a product of iron and steel, blast or open hearth furnaces), C. L., from Youngstown, O., to Buffalo, N. Y., 154c per net ton.

59483 (1). Establish on **fluxing stone**, minimum weight (see note), from Bedford-Bloomington, Ind., Dist. to Verona, Penn., 263c per gross ton.

Note—Rates will only apply on shipments when loaded in open top cars, except during period of general car shortage, when open top equipment is not available and closed equipment is furnished at carrier's option, the rates provided herein will apply.

59527. Establish on **stone, fluxing**, furnace or foundry, melting and refractory (unburnt), in bulk, in open top cars, C. L., from Carey, O., to Ashtabula, and Painesville, O., 116c per gross ton.

59528. Establish on **lime**, viz.: Common, hydrated, quick or slaked, also agricultural and fluxing, from Speed, Ind., to the following points: ("A" refers to min. wt. of 30,000 lb. and "B" to min. wt. of 50,000 lb.): To Lawrenceville, Ill., "A" 14, "B" 12; Osgood, Ind., "A" 12, "B" 10; Lawrenceburg, Ind., "A" 13, "B" 10½; Connersville, Ind., "A" 13, "B" 10½; Cauyga, Ind., "A" 15, "B" 12; Ladoga, Ind., "A" 14, "B" 11; Pendleton, Ind., "A" 14, "B" 11; Charleston, Ill., "A" 16, "B" 13;Greensburg, Ind., "A" 12, "B" 10; LaFayette, Ind., "A" 15, "B" 12; Robinson, Ill., "A" 15, "B" 12; Goshen, Ind., "A" 17, "B" 14; Champaign, Ill., "A" 16, "B" 13; Danville, Ill., "A" 15, "B" 12; Veedersburg, Ind., "A" 15, "B" 12; Brownsburg, Ind., "A" 13, "B" 10½; West Salem, Ill., "A" 14, "B" 12; Mt. Vernon, Ind., "A" 14, "B" 12; LaPorte, Ind., "A" 17, "B" 14; Valparaiso, Ind., "A" 17, "B" 14; Hobart, Ind., "A" 17, "B" 14; Indianapolis, Ind., "A" 13, "B" 10; Hartford City, Ind., "A" 15, "B" 12; Royal Center, Ind., "A" 15, "B" 12; Wolcott, Ind., "A" 15, "B" 12; North Vernon, Ind., 'A" 11, "B" 9; Madison, Ind., "A" 12, "B" 10; Terre Haute, Ind., "A" 15, "B" 12: Marshall, Ill., "A" 15, "B" 12; Effingham, Ill., "A" 16, "B" 13; Crawfordsville, Ind., "A" 14, "B" 12; South Bend, Ind., "A" 17, "B" 14; Vincennes, Ind., "A" 14, "B" 12; Linton, Ind., "A" 14, "B" 11; Princeton, Ind., "A" 13, "B" 10½; Sullivan, Ind., "A" 14, "B" 12.

59611 Establish on **crushed slag** or **crushed commercial slag** (other than granulated), in open top cars, C. L., Hamilton, Ohio, to Newark, Ohio, 138c per net ton.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason: No present or prospective movement.

Note 5—Reason: Comparable with rates from other origins in immediate vicinity.

Note 6—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

Note 7—The oil, tar or asphaltum not to exceed 10% of weight of the commodity shipped, the shipper to so certify on shipping order or bill of lading.

Trunk

Sup. 1 to 37968. **Limestone, crude, fluxing and furnace**, in open top equipment, C. L., (See Note 3), from Cavetown, Md., Bittinger, Penn., and Thomasville, Penn., to Bellaire, Ohio, Benwood, W. Va. and Follansbee, W. Va., $1.39 per gross ton. (See Note 3.)

Sup. 2 to 37968. **Limestone**, crude, fluxing and furnace, in open top equipment, C. L., (See Note 3), from Bellefonte, Pleasant Gap, Howard, Penn., and Inwood, W. Va., to Bellaire, Ohio, and Benwood, W. Va., $1.39, to Bentley, Ohio, $1.62 and to Huntington W. Va., $2.20 per gross ton, in lieu of current sixth class rates. (See Note 5.)

Sup. 1 to 37998. **Limestone**, crude, fluxing, foundry or furnace when loaded in top equipment, C. L., (See Note 3), from Bellefonte, Pleasant Gap, Howard, Penn., and Inwood, W. Va., to Bethlehem, Penn., $2.04 and to Lebanon, Penn., $1.62; from Inwood, W. Va., to Sayre, Penn., $2.40 per gross ton; from Bittinger, Thomasville and York, Penn., to Wilmington, Del., $1.45 per gross ton. (See Note 5.)

38022. **Crushed stone**, in bags, C. L., min. wt. 50,000 lb., from Easton (13th St.), Penn., to Long Island City, N. Y., $2.71 per net ton, in lieu of current sixth class rate.

38026. **Magnesite**, dead burned, caustic or calcined, other than dead burned, C. L., min. wt. 40,000 lb., from Millville, W. Va., to Hamilton and Chippewa, Ont., 35c per 100 lb., in lieu of current sixth class rates.

38029. **Limestone, crude**, fluxing, foundry and furnace, in open top equipment, C. L., min. wt. (See Note 3), from Capon Road and Strasburg Junction, Va.; Allegheny, Penn., 116; Bessemer, Penn., 116; Butler, Penn., 139; Demmler, Penn., 116; Economy, Penn., 139; Etna, Penn., 116; Gibsonton, Penn., 116; Glassport, Penn., 139; Johnstown, Penn., 103; Junction Transfer, Penn., 116; McKeesport, Penn., 116; Midland, Penn., 139; Mill-

ville, Penn., 116; Monessen, Penn., 116; Monaca, Penn., 139; Pittsburgh, Penn., 116; Rankin, Penn. 116; Scottdale, Penn., 116; Toronto, O., 139; West Homestead, Penn., 116, being rates in cents per gross ton. (See Note 5.)

38030. **Stone,** crushed and screenings, in straight or mixed C. L. (will not include agricultural limestone or ground limestone, unburnt, fluxing stone or firestone or stone coated with oil, tar or asphaltum), (See Note 3), from Monocacy, Penn., to Butler, Penn., $2.42 per net ton, in lieu of current commodity rate of $3.36 per net ton.

38051. **Slag,** C. L., (See Note 3), from Sparrows Point, Md., to Front Royal, Va., $1.65 per net ton, in lieu of current sixth class rates of 19c per 100 lb.

Sup. 2 to 37944. **Feldspar,** C. L., to Abingdon, Alton, East St. Louis, Granite City, Macomb, Monmouth, White Hall, Ill., and St. Louis, Mo., from Conowingo, Md., $6 and from Trenton, N. J., $6.20 per net ton (See Note 5).

38058. Establish a switching charge of 28c per net ton, min. charge $10 per car on slag, from and to Reading, Penn., in lieu of current commodity rate of 66c per net ton. Reason: Account comparable with charge on crushed stone.

38068. **Limestone, crude,** in open top equipment, C. L., (See Note 3), from Berkeley, Inwood and Martinsburg, W. Va., to Avonmore, Penn., $1.39 per gross ton; and **limestone, crude, fluxing, foundry and furnace,** in open top equipment, C. L., from Bellefonte, Howard, Naginey and Pleasant Gap, Penn., to Avonmore, Penn., $1.16 per gross ton, in lieu of current sixth class rates. (See Note 5.)

38069. **Stone,** natural (other than bituminous asphalt rock, **crushed,** with or without coating of oil, tar, tar and/or asphaltum, C. L., (See Note 3), from Jamesville, N. Y., to L. V. R. R. stations in New York (rates in cents per net ton):

Ithaca, $1.43; Willow Creek, $1.54; Ovid, $1.54; MacDougall, $1.54; Cayuta, $1.43; Alpine, $1.43; Burdett, $1.43; Gilbert, $1.54; Vineyard Siding, $1.54; Kandaia, $1.54; Yale, $1.54; Pre-Emption, $1.54; Stanley, $1.54; Gorham, $1.54; Rushville, $1.54; Middlesex, $1.54; Naples, $1.65; Manchester, $1.54; Hanna, $1.43; Barton, $1.43; Berkshire, $1.21; Richford, $1.21; Throop, $1.32; Brick Church, $1.43.

38075. **Limestone, ground or pulverized,** C. L., min. wt. 60,000 lb., from Oriskany Falls, N. Y., to Skaneateles Village, N. Y., $1.43 per net ton, in lieu of current 6th class rate of $3.20 per net ton. (See Note 5.)

38091. **Feldspar,** crude or ground, and **syenite,** crude or ground, C. L., (See Note 1), from Genesee Dock and Rochester, N. Y., to Abingdon, Alton, East St. Louis, Granite City, Macomb, Monmouth, Whitehall, Ill., and St. Louis, Mo., $5.30 per net ton, in lieu of current class 21 rates, subject to min. wt. of 60,000 lb. (See Note 5.)

38093. (A) **Dolomite,** crude, C. L., and (B) **dolomite,** roasted, C. L., (See Note 3), from Pleasant Gap, Penn.: "A" refers to gross ton, "B" to net ton. To

Pittsburgh, Penn., "A", 116; "B", 189; Monessen, Penn., "A", 116; "B", 189; Aliquippa, Penn., "A", 139; "B", 214; Steubenville, Ohio, "A", 139; "B", 214; Youngstown, Ohio, "A", 162; "B", 214. in lieu of current sixth class rates. (See Note 5.)

38106 (increase). Cancel commodity rates on **ground slate,** C. L., min. wt. 50,000 lb., to St. Jerome, Que., of 29c per 100 lb., from Cardiff, Whiteford, Md., Delta and Slate Hill, Penn., and 28c per 100 lb., from Muncy, Pa., as published in P. R. R. Tariff I. C. C. 2014 and Reading Co. I. C. C. 1994. (See Note 5.)

38107. **Roasted dolomite,** C. L., (See Note 3), C. L., from Williams and Blue Bell Penn., to Buffalo, N. Y., $2.66 per net ton, in lieu of current commodity rate of $2.77 per net ton. Reason—Comparable with rates from other points.

Southwestern

17579. **Lime,** Dittlinger, Houston, Lime City, McNeil, Oglesby and Round Rock, Tex., to University Park and Connors, Colo., establish rates on lime, C.L., as described in Item 265-I, S. W. L. Tariff 227-A, from the origins named in that item to University Park and Connors, Colo., of 38c per 100 lbs. on 30,000 lbs., and 30c per 100 lbs. on 50,000 lbs., via routes currently in effect to the C. & S. Ry. in Item 266-C, S. W. L. Tariff 227-A.

17759. **Lime,** Oklahoma City, Okla., to Walsenburg, Colo. Establish rate of 30c per 100 lb., min. wt. 30,000 lb. and rate of 24c per 100 lb., min. wt. 50,000 lb., on lime, as described in Item 265-I, S. W. L. Tariff 227-A, I. C. C. 2825.

17935. **Agricultural limestone,** Mosher, Mo., to points in Southern Missouri. Establish the following rates on agricultural limestone for soil fertilization only, C. L., from Mosher, Mo., to destinations in Southeast Missouri: Delta, 93c; Williamsville, 93c; Poplar Bluff, 106c; Charleston, 102c; Dexter, 106c; Birds Point, 106; Sikeston, 102; Neelyville, 110c; Doniphan, 119c; Jackson, 106; Samos, 106c.

17960. Establish on **lime,** C. L., from Mosher and Ste. Genevieve, Mo., rates of 572c, min. Wt. 30,000 lb., and 458c, min. wt. 50,000 lb., to Morganton, N. C.; 648c, min. wt. 30,000 lb., 519c, min. wt. 50,000 lb., to North Wilkesboro, N. C.; and 561c, min. wt. 30,000 lb., 449c min. wt. 50,000 lb., to Sylva, N. C. Rates stated in cents per ton of 2000 lb.

19831. **Stone, broken,** C. L. Establish from River Bridge, N. C., to Bessemer, Penn., 526c; Chester, Penn., 504c; Hays, Penn., 526c net ton; Buffalo, N. Y., 30c; Canton and Massillon, Ohio, 25c; Cleveland, Warren and Youngstown, Ohio, 26c cwt.

19901. **Crushed stone,** C. L. Establish 45c net ton from Beverly, S. C., to Greer and Taylors, S. C. Truck competition.

19908. **Stone,** crushed, C. L. Establish 120c net ton from Conrock, Fla., to Stuart and Salerno, Fla. Water competition. Expires Dec. 31, 1939.

19945. **Phosphatic sand or clay,** C. L., min. 54,000 lb. Establish 200c net ton, Nichols, Fla., to Fort Pierce, Fla.

Southern

19983. **Sand,** C. L. Establish 50c net ton, Dawesville, Ga., to Valdosta, Ga. Truck competitive. Expires Dec. 31, 1939.

19990. **Gravel, sand and slag,** C. L. Establish 32c net ton, Petersburg, Va., to DeWitt, Va. Truck competitive. Expires December 31, 1940.

20017. **Crushed stone,** C. L. Establish Greer, S. C., from Blair 75c, Columbia 92c, Gaffney 55c and Rion 120c, and to Taylors, S. C., from Blair 75c, Columbia 95c, Gaffney 65c and Rion 120c net ton.

20021. **Crushed stone,** C. L. Establish 85c net ton—Stockbridge, Ga., to Commerce, Ga. Truck competitive. Expires Dec. 31, 1939.

20025. **Moulding sand,** C. L. Establish 231c net ton—Lexington, Tenn., to St. Louis, Mo., East St. Louis and Belleville, Ill.

20038. **Sand,** C. L. Establish 30c net ton, Mascot and Strawberry Plains, Tenn., to Knoxville, Tenn. Truck competitive.

20122. **Sand and gravel,** C. L. Establish 60c net ton, Myles, Miss., to Vicksburg, Miss. Truck competitive. Expires June 30, 1940.

20121. **Roofing granules,** C. L. Establish 770c net ton, Dutch Gap and Esmont, Va., to Shreveport, La.

20127. Establish from Pharr to Pembroke, Fla., net transit rate of 11c gross ton on wet phosphate rock to be dried or dried and mixed or converted into phosphate rock sinter and reshipped via A. C. L. R. R.

20220. **Sand, gravel and crushed stone,** C. L. Establish 60c net ton, Rockwood, Ala., to Emco, Ala.

New England

48342 (2-R). **Lime rock,** min. wt. 80,000 lb., except that when cars are loaded to cubical or visible capacity actual weight will apply, Rockland, Me., to Livermore, Falls and Rumford, Me. Present—9 and 10, respectively, as per Me. C. I. C. C. C4509. Proposed—7½. Reason. To place rates to those points on a parity with those published to other stations on the Me. C. R. R.

Illinois

IRC 6536-1. **Sand,** industrial, Ottawa, Ill., to Quincy, Ill., (See Note 3), but not less than 40,000 lb. Present—$1.84 net ton. Proposed—$1.78 net ton.

I. R. C. 7497-17. **Agricultural limestone,** as described in tariff (see Note 3), from Krause and East St. Louis, Ill., to C. & I. M. R. R. stations:

	From Krause		E. St. Louis	
To (Representative)	Pres.	Pro.	Pres.	Pro.
Compo, Ill.	111	90	111	90
Callaway	99	90	111	90
Taylorsville	99	99	99	88
Barr	117	94	111	94
Petersburg	121	100	111	100
Parkland	121	110	...	...

I. R. C. 8866. **Sand** (except industrial), and gravel, C.L., from Pekin and Lincoln, Ill., to Jacksonville, Ill. Present, 84; proposed, 70.

I. R. C. 8869. **Crushed stone,** C.L., from Forman, Ill., to various Illinois points in I. R. C. territory: Present: class rates. Proposed to (Representative): Shattuc, $1.10; Woodlawn, 99c; Christopher, 88c; Freeman, 77c; Nellson, 77c; Goreville, 66c. (Rates per net ton.)

IRC 8899. **Sand,** industrial, (See Note 3), but not less than 40,000 lb., from Ottawa and Utica, Ill., to Highlands, Ind. Present—$1.54 net ton. Proposed—$1.24.

CSC 465-O. **Sand, gravel, crushed stone, etc.** To amend Agent Jones' Tariff 197-Q, also tariffs of individual lines to provide for rate of 50c per 100 lb., C. L. min. wt. 100,000 lb., in lieu of present single line rate of 72c per 100 lb. on sand, gravel, crushed stone and slag, from Bellwood and McCook, Ill., to Gary, Ind.

Texas-Louisiana

4005. Establish the following rates on **crushed asphalt rock, asphalt coated stone,** etc., as described in Item 400, Texas Lines' Tariff 84-B, from Cline, Blewett, Dabney, Pulliam, Whitesmine to the following points: Ft. Worth, 200c; Dallas, 206c; Wichita Falls, 240c; Sherman, 230c; Georgetown, 128c; Taylor, 132c; Wharton, 157c; Dayton, 172c; Liberty, 193c; Sugar Land, 154c; Bowie, 219c; Tyler, 210c; LaGrange, 144c; Conroe, 201c; Schulenburg, 122c; Weimar, 128c; Orange, 107c; Aleman, 183c; Hamilton, 183c; Ireland, 170c; Gatesville, 176c; Houston, 148½c; Galveston, 189c.

4040. Establish rate of 47c per ton on **sand and gravel,** straight or mixed C. L., from Dolman and Klimek to Sealy, San Felipe and Enos, Texas. Proposed rate to apply only on material to be used on the construction of a highway from Sealy to Brookshire and shall expire with completion of the project.

Most Modern Lime Plant

(Continued from page 50)

The cooler on the kilns is sectioned and there are four draw gates, one to each section, which are entirely independent of each other. More or less lime can be drawn from any section as desired. The draw car, which is also divided into four compartments, has a capacity of 7 tons; and before drawing it is moved under the draw gates. When drawing, the four gates are opened and lime pours into the car. One minute to a gate is all that is necessary; in less than four minutes, the kiln is drawn, as the car doesn't have to be shifted when drawing the kilns.

Kiln Drawn in Four Minutes

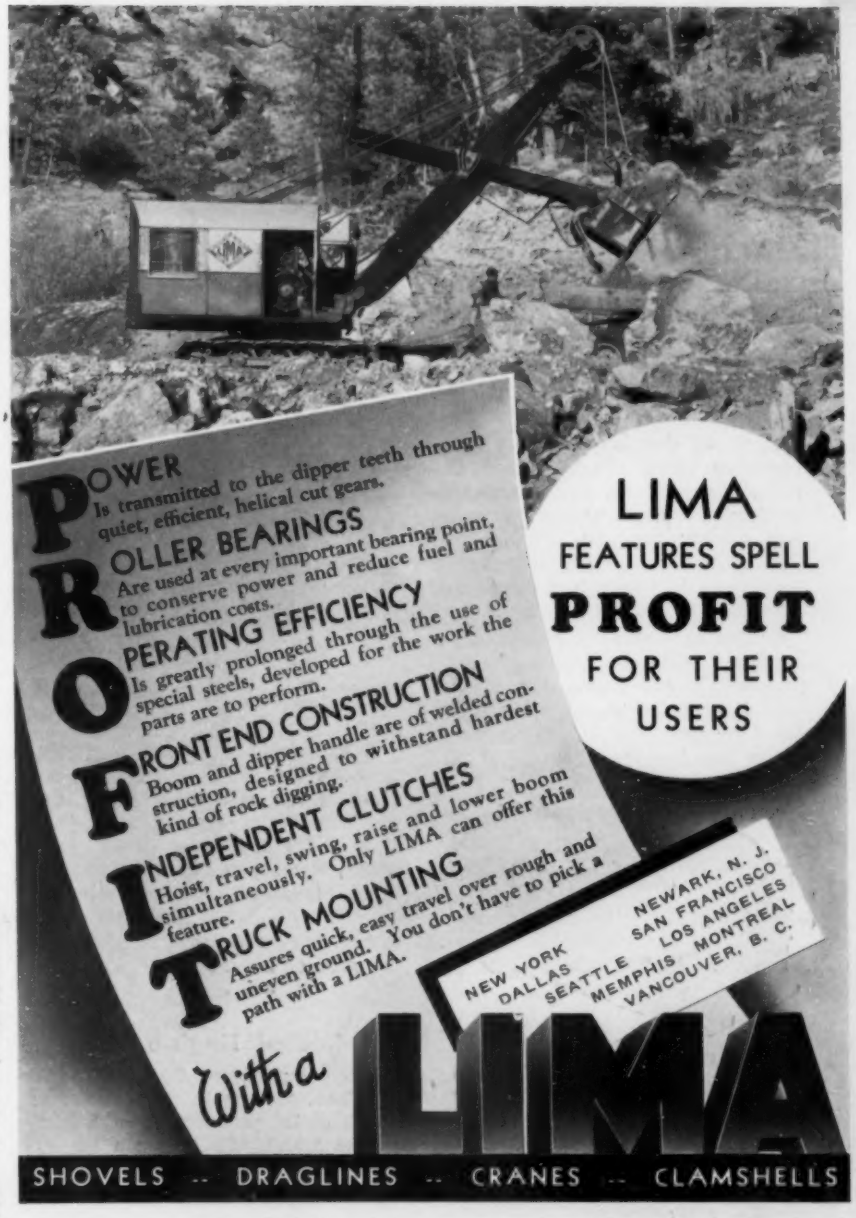
After drawing, the kiln is trimmed and the charge inside dropped, then the men move the lime car over the lime pit (Fig. 13), into which the lime car discharges and from which the picking conveyor draws the lime (Fig. 14). This passes the lime to the screen, or through the crusher, to the carloader, or to hydrator bins or whatever it is desired.

As drawing requires only four minutes of one man, trimming seldom requires as much as fifteen minutes of two men. Firing consists only in looking over the gauge board every half hour and making minor adjustments, picking being made as convenient as possible, so that even for 150 tons of lime a day three men only are necessary on a shift for all operations, charging, firing, drawing, trimming, picking, crushing and loading. The working force consists of one working foreman, one fireman and one lime man, but while each has his main duty, they all help each other; and while there are no prolonged rests, no one is over-worked.

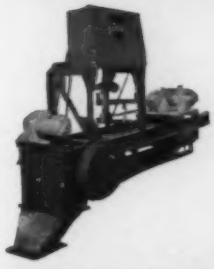
Labor efficiency is higher even than that in a rotary kiln plant, fuel efficiency much more so, and investment for equal capacity a mere fraction. It is not easy to imagine a plant arrangement capable of higher economy along any of the main lines. This plant seems outstanding in all respects.

An additional desirable feature is that the kiln is arranged for complete sealing, so if it is desired to give the men the week-end, the gas can be shut off and the kiln bottled, under which conditions it loses very little heat and is still quite hot on Monday and ready for continuation of the interrupted operation.

In Figure 15 is the group of four men who collectively conceived, designed and erected the plant.


POWER
Is transmitted to the dipper teeth through quiet, efficient, helical cut gears.
ROLLER BEARINGS
Are used at every important bearing point, to conserve power and reduce fuel and lubrication costs.
OPERATING EFFICIENCY
Is greatly prolonged through the use of special steels, developed for the work the parts are to perform.
FRONT END CONSTRUCTION
Boom and dipper handle are of welded construction, designed to withstand hardest kind of rock digging.
INDEPENDENT CLUTCHES
Hoist, travel, swing, raise and lower boom simultaneously. Only LIMA can offer this feature.
TRUCK MOUNTING
Assures quick, easy travel over rough and uneven ground. You don't have to pick a path with a LIMA.
LIMA
FEATURES SPELL
PROFIT
FOR THEIR
USERS
NEW YORK
DALLAS
SEATTLE
MEMPHIS
VANCOUVER, B. C.
NEWARK, N. J.
SAN FRANCISCO
LOS ANGELES
MONTREAL
With a LIMA
SHOVELS -- DRAGLINES -- CRANES -- CLAMSHELLS

What rate per hour? What weight per day?



THE FEEDOWEIGHT GIVES THE ANSWER

Feeding, proportioning and batching — entirely automatic. The result — finished products of uniform quality with minimum manufacturing costs. The FEEDOWEIGHT correctly and uniformly feeds material by weight. In addition, an automatic totalizer will give you the exact total weight of all material so fed. It is a machine of unexcelled accuracy. Eliminate guesswork in your plant.

Write today for bulletin 388.

MERRICK SCALE MFG. CO. 184 AUTUMN STREET PASSAIC, NEW JERSEY

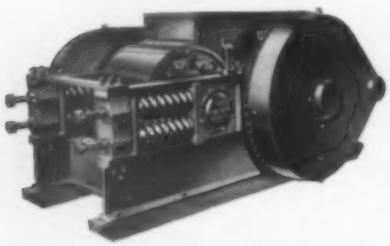
NEW MACHINERY * NEW EQUIPMENT

Roll Crusher With Sealed Roller Bearings

IOWA MANUFACTURING Co., Cedar Rapids, Iowa, has developed a 24- x 40-in. roller bearing equipped roll crusher having several interesting features.

Each roll shell is made up of seven segments which are locked on the main rotor with tapered wedges and locking bars. Segments can be easily and quickly removed without disturbing bearings or shafts, and are tapered so that when locked together they form a complete circle.

The 24 in. width roll gives greater capacities, rated as follows: At approximately 500 f.p.m., 150 to 250 tons per hour of 2½ in. rock; 90 to 150 tons per hour of 1½ in. size; 60 to 100 tons per hour of 1 in.



Design roll crusher with sealed-in roller bearings

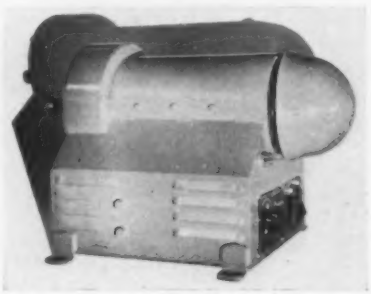
product; 45 to 75 tons per hour of ¾ in. material and 30 to 50 tons per hour of ¼ in. specification. Sizes of finished product given are through a round screen opening.

Small Welder for Belt or Direct Drive

THE LINCOLN ELECTRIC Co., Cleveland, Ohio, has brought out a small arc welding machine. Known as the "Shield-Arc Junior" this unit has been built for use in conjunction with an engine or electric motor drive. It can be used with either bare or shielded arc type electrodes.

The "Shield-Arc Junior" is rated at 200 amp. and its current range, welding duty, 30-volt arc, is 60 to 250 amp. The machine is 29⅝ in. long over pulley, 18 in. high with a base 15½ x 19⅝ in. The net weight is 320 lb.

A feature of this welder is the system of voltage and current control, known as dual continuous control, now made available for the first time on a small belt-driven model,

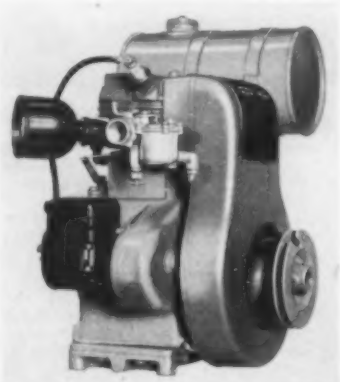


Welder of 200 amp. capacity designed for either belt or direct drive

which, according to the manufacturer, permits independent adjustment of voltage and current, giving complete and separate control of arc heat and arc penetration for easy, speedy welding of any job. The generator is single operator, variable voltage type with laminated pole pieces. The generator armature is mounted on a large shaft with pulley.

Air-Cooled Engine

WISCONSIN MOTOR CORP., Milwaukee Wis., is now in production on an air-cooled gasoline engine, known as the Model AK. It has a horsepower range of 2.5 at 1400 r.p.m. to 4.2 at 2400 r.p.m., a 2⅞-in. bore, 2¾-in. stroke, and a piston displacement of 17.8 cu. in.



Lightweight gasoline engine rated at 4.2 hp. at 2400 r.p.m.

A large fan cast in the flywheel supplies a blast of air which it is said will cool the engine in the most extreme temperatures. The engine may be started with a rope or hand crank starter, but a foot pedal can be furnished at extra cost. A balanced crankshaft is mounted on two oversize Timken roller bearings. Ignition is provided by a high tension magneto with impulse coupling mounted on the outside of the engine. The engine is lubricated by a pump circulated splash system, the oil pump being operated from the camshaft.

This engine is exceptionally light weight for the horsepower delivered. The net weight of the standard engine with all accessories is 74 lb.

Excavator Has Improved Clutch and Brake Housings

THE OSGOOD Co., Marion, Ohio, has brought out a combination shovel, dragline and crane in the 1-1¼ yard class.

This machine, designated Type 60, is available as the Model 600 with 20-

Combination shovel, dragline and crane

ft. boom, 16-ft. handle, 1-cu. yd. dipper, 100 hp. gasoline motor, 11-ft. 10-in. crawlers, and as the Model 605 with 21-ft. boom, 16-ft. handle, 1¼-cu. yd. dipper, 120 hp. gasoline motor, 12-ft 3-in. crawlers. Diesel power may be substituted for gasoline.

A new feature on the Type 60 is the bolting-on of clutch and brake housings on the drum shaft. The drums are of cast steel, the housings being of close grain nickel iron, highly polished. Bands, of the outside, contracting type, are in halves for easy replacement, and lined with molded blocks. The Type 60 also has "Servo" control of clutches and brakes.

In shovel service, an independent chain crowd unit is mounted on the main body casting. The chain sprocket at the boom foot is in line with the boom foot hinge pins, and therefore the crowd chain tension is self ad-

justing to all boom angles. The crowd chain has a tensile strength of 75,000 lbs.

Shovel boom and handle are of all-steel box girder type, electrically welded. Boom point sheaves are 30-in. diameter, insuring long rope life. Dipper has renewable lip, and reversible teeth, and is tripped thru the Osgood type vacuum trip.

Crane booms are of box type with heavy chord angles and pipe lattice, all electrically welded, and are made in two sections for ease in handling, and for insertion of lengthening units. Tagline for clamshell service is built into the boom.

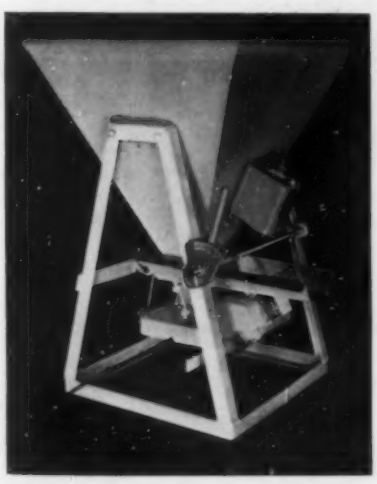
Vibrating Feeder For Dry Materials

SYNTRON CO., Homer City, Penn., has announced a small model dry feeder, having a one cubic foot hopper to supply material to a vibratory feeder conveyor trough.

The rate of flow of material through this feeder trough is regulated by the amplitude of the trough's electro-magnet vibrator which is controlled by means of a rheostat mounted in a separate wall panel controller supplied with each machine.

The hopper is kept free flowing by a small electro-magnet vibrator attached to one of its sides that prevents arching over and clogging up of material.

Designed primarily as a piece of laboratory equipment and for taking care of very small feeds of material to industrial processing machines such as mixers, pulverizers, screens, etc., and for handling chemical reagents, this model, FM-0-10, will answer many requirements not justifying larger capacity.



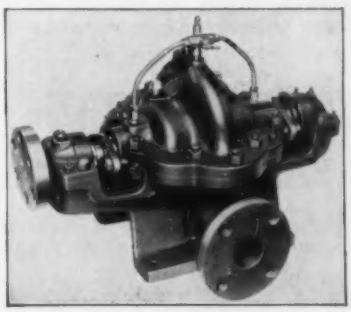
Small vibrating feeder for dry materials

Centrifugal Pumps With Ball Bearings

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., Centrifugal Pump Division, announces the inclusion of ball bearings as standard equipment on nearly all its line of single stage centrifugal pumps where peripheral speeds are not excessive. However, bearing housings are designed so that either type of bearing may be accommodated.

The design, selected in coöperation with leading ball bearing manufacturers, is a single row deep groove ball bearing on both ends of the pump in cast iron adapters arranged for grease lubrication. Designs call for conservative loadings based on carefully computed thrust and radial loads.

Lock nuts used on the shaft at both ends conveniently hold the ball bearings in place without resorting



Single stage centrifugal pump equipped with ball bearings

to any press or shrink fits. Their use makes the bearings entirely standard, requiring no special tools or special care in assembling or dismantling, and when needed makes the bearings easily obtainable.

The use of an adapter inside the main housing provides a sort of double seal which prevents grease from leaking to the exterior of the pump and at the same time any water which may enter the bearing housing will be thrown off from the shaft before it can enter the adapter.

Lightweight Shovel

UNIVERSAL POWER SHOVEL CORP., Milwaukee, Wis., has announced a new ¾ cu. yd. shovel to complete its line of small sized excavators. The machine, known as the 1020 model, is of lightweight construction. It is equipped with a 19 ft. boom and a 14 ft. stick to provide ample reach and dip for practically any type of job. Crawlers are 20-in. x 11 ft. 5 in. running on drop forged, heat-treated rollers. All gears and bearings are

Lightweight ¾-cu. yd. shovel has 19-ft. boom and 14 ft. stick

fully enclosed in a dust-proof, oil-tight one-piece cast case. The 1020 model is convertible to all attachments.

Other features of the shovel include drop-forged, heat-treated alloy steel gears, ten spline fittings throughout main machine case, power unit mounted integral with operating mechanism, and direct drive from engine to countershaft.

Gear Shifting Guide For Truck Drivers

FORD MOTOR CO., Detroit, Mich., has introduced what is known as a Shiftoguide speedometer as standard equipment on all Ford regular and cab-over-engine trucks, except three-quarter ton and one-ton types.

The new instrument is said to do away with guess work in gear shifting, and does virtually everything that a tachometer would do for the truck operator. The dial of this speedometer shows at a glance the correct speed ranges in which the truck should be operated in low, second, third and high gears. As the speedometer pointer crosses the line dividing the different ranges, the operator knows that is the correct time to shift the gears up or down as load and road conditions demand. He doesn't have to rely on experience, instinct or "feel" to get best results from his truck.

Calibration of the speedometer is arranged to show that gears should be shifted as follows when accelerating: Low to second at 6 miles per hour; second to third at 12 miles per hour; and third to high at 26 miles per hour. When pulling loads up long grades, the proper speeds for shifting to lower gears are the same as those above, but in the reverse sequence.

New Gravel Plant At Chillicothe, Ill.

McELWEE AND ROGY, INC., has started the construction of a new gravel plant about a mile south of Chillicothe, Ill., on 55 acres of property on the Illinois River bank. The plant will be equipped to screen, wash, and size 600 tons daily. For the present trucks will be used for handling materials in the plant, but conveyors will be utilized when the new unit is completed.

Open New Quarry

HALVORSON BROTHERS, Rochester, Minn., has opened a new quarry southwest of the city. Holes drilled to a depth of 75-ft. with a well drill indicate rock of good quality for the entire deposit. The quarry was opened with a 6-tons of explosive, and is scheduled to furnish 60,000 tons of crushed rock for the new Rochester airport. For this job, one of the largest portable crushers in operation will be used. When operating at maximum capacity, this unit can produce between 75 and 100 tons of crushed rock an hour, all crushed down to ⅝-in. Peter Halvorson and Leonard Halvorson are partners in the company.

Temporary Shutdowns of Cement Plants

ASH GROVE LIME & PORTLAND CEMENT CO., Chanute, Kans., has temporarily suspended operations at this plant. However, the shipping department will remain open, said Guy Gardner, superintendent, and there will be repair gangs which will absorb considerable labor.

LAWRENCE CEMENT CO., Northampton, Penn., closed down September 1, with bins full.

LONE STAR CEMENT CORP., Bonner Springs, Kans., plant which has been closed down since August 20th to make extensive repairs and alterations, plans to resume operation on October 1.

Resume Operations at Cement Mills

PENNSYLVANIA-DIXIE CEMENT CO. plant at Clinchfield, Ga., has reopened after a temporary shut-down. Shut-down was due to seasonal slack, and the plant will probably operate continuously until sometime in December, according to Superintendent E. P. Newhard.

WASHINGTON-IDAHO LIME PRODUCTS CO., Orofino, Idaho, which closed its cement plant for 30 days, resumed full operation September 1, according to Otto C. Frei, vice-president and general manager. The company has orders to keep it busy the rest of the year. Minor improvements were made during the shutdown. The company also has purchased an International DR-74 truck with dual axle, semi-trailer, capable of hauling a gross load of 58,000 lb. It will be used to haul cement between Orofino and Spokane, Wash.

Another Cement Unit for the West

CARNEVA PORTLAND CEMENT CO., Carrara, Nev., is the name of a new cement plant, a few details of which were mentioned in ROCK PRODUCTS, August, 1939, p. 100. It is a comparatively small pilot plant which will make a very white portland cement from a white marble and a white silica-aluminum clay. Later a 1000-bbl. mill may be erected.

Buys Gravel Plant

MOBLEY CONSTRUCTION CO., Newport, Ark., has purchased the sand and gravel plant just south of the White river highway bridge from Sol Heinemann and the Pearl City Packet Co. According to D. H. Atkinson, manager of the Mobley company, the Heinemann equipment will be held by the company as a reserve unit, and no definite plans have been made for its operation.

Diamond to Build More Storage

DIAMOND PORTLAND CEMENT CO., Middle Branch, Ohio, has asked for bids on a general contract for a one-story building at North Canton, Ohio, to be used for storage and distribution. It will cost about $150,000 with equipment.

THE OUTSTANDING GRAVEL PLANT OF THE YEAR.

KERN RADIAL STORAGE SYSTEMS HAVE BEEN CHOSEN AGAIN.

LOWER PRODUCTION COSTS AND CONTROLLED SPECIFICATION MATERIAL ASSURED.

Inspect the new plant of the Wolf River Sand & Gravel Co. at Memphis, Tennessee

DESIGNED & FURNISHED BY THE

P. O. Box 2057 **FRED T. KERN CO.** Milwaukee, Wis.

More Cement Ordered for Grand Coulee

TO PREVENT a cement shortage, the Bureau of Reclamation has ordered 125,000 bbl. of cement from Montana and California companies for use at Grand Coulee. The Pacific Portland Cement Co., Redwood, Calif., will supply 46,000 bbl., and the Three Forks Portland Cement Co., at Trident, Mont., will furnish 79,000 bbl., according to reports.

Strike Holds Up Capitol Construction

CONSTRUCTION projects in Washington, D. C., totaling $54,000,000, were held up by the strike of 200 employes at the Smoot Sand and Gravel Co., Washington, D. C., which prevented the delivery of aggregates. The lack of sand and gravel threw out of work an estimated 5000 additional building workers.

Dust Collectors For Tennessee Cement Mill

PENNSYLVANIA-DIXIE CEMENT CORP. plans to modernize its Kingsport, Tenn., plant, including the installation of a dust collecting system. It is expected that this work will be started in the near future.

Cement Stocks Lower Than Year Ago

LATEST FIGURES on portland cement production and shipments released by the Bureau of Mines show that in July, 1939, the industry produced 12,644,000 bbl., shipped 11,755,000 bbl., and had in stock at the end of the month 22,366,000 bbl. Production and shipments in July, 1939, showed increases of 15.2 and 16.1%, respectively, as compared with July, 1938. Portland cement stocks at mills were 4.1% lower than a year ago. Statistics here given are compiled from reports for July received by the Bureau of Mines from all manufacturing plants.

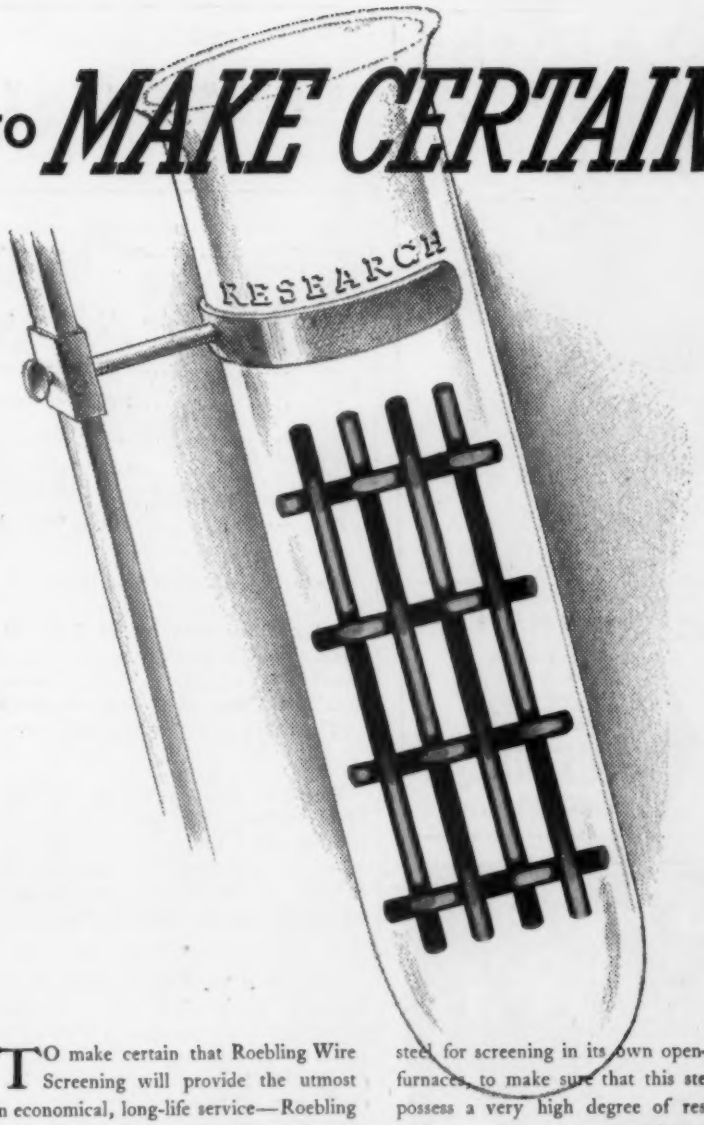
The mill value of the shipments, 54,268,000 bbl., in the first half of 1939, is estimated as $79,088,000. Shipments for the first half of the year include approximately 1,920,000 bbl. of high-early-strength portland cement with an estimated mill value of $3,829,000.

In the following statement of relation of production to capacity, the total output of finished cement is compared with the estimated capacity of 161 plants at the close of July, 1938 and 1939.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	July	June	May	April
The Month	50.2	57.9	56.5	50.9	45.7
12 Months	40.8	45.0	44.3	43.8	43.5

TO *MAKE CERTAIN*



TO make certain that Roebling Wire Screening will provide the utmost in economical, long-life service—Roebling carries on a constant program of wire screening research. This research is conducted in one of the country's most modern, completely equipped Industrial Research Units—where a wide variety of screening wear and vibration problems are continually being studied. As part of this program, Roebling Wire Screening is subjected to laboratory tests that often exceed actual service conditions in severity.

To further assure you of long life and dependable service, Roebling makes special steel for screening in its own open-hearth furnaces, to make sure that this steel will possess a very high degree of resistance against wear and corrosion. In addition, Roebling also controls every process of screening manufacture, from steel making to final fabrication.

We invite your inquiry for further information. Roebling Wire Screening is made in a wide range of types and metals for all cleaning, grading and sizing purposes.

JOHN A. ROEBLING'S SONS CO.
TRENTON, N.J. *Branches in Principal Cities*

ROEBLING ABRASO SCREEN

TRADE JERSEY MARK

90 YEARS OF WIRE MAKING SPELLS THE DIFFERENCE

LOAD the CHEAPEST WAY—

The cheapest loading method is the one that holds the trucks for the shortest time. Truck time is the important factor in loading costs. Since 1919 Barber-Greene Loaders have continuously earned this reputation. Write for complete information, there is no obligation.

Standardized Material Handling Machines

BARBER GREENE

Aurora, Illinois

39-13

You KNOW that even for your most difficult separations your UNIVERSAL will operate with amazing efficiency and economy. Will produce a thoroughly clean separation whether materials are dry, damp, wet or sticky. Heavy pressed steel construction throughout, gives greatest strength and longest life.

Illustrated catalog on request.

UNIVERSAL VIBRATING SCREEN CO.

RACINE - - WISCONSIN

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Arundel Corp.	$0.25	Oct. 2
Basic Dolomite	.06¼	Sept. 15
Ideal Cement Co.	.35	Sept. 30
Kelley Island Lime & Transport Co.	.25	Sept. 30
Medusa Portland Cem.	1.00	Oct. 2
Minnesota Mining & Mfg.	.65	Sept. 30
Pennsylvania Glass Sand, pfd.	1.75	Oct. 20
Superior Portland Cem., A.	.82½	Oct. 2
Superior Portland Cem., B.	1.00	Oct. 10
U. S. Graphite	.25	Sept. 15
Yosemite Portland Cem., pfd.	.10	Oct. 1

•

AMERICAN AGRICULTURAL CHEMICAL Co. showed a net profit of $764,694 for the fiscal year ended June 30, 1939, after depreciation, depletion, reserves for insurance, federal taxes, etc. This compared with a net profit of $1,401,075 in the preceding year.

•

PEERLESS CEMENT CORP., Detroit, Mich., earned a net profit of $97,627 for the six months ended June 30, 1939. This compares with a deficit of $75,864 in 1938. These earnings are computed before federal taxes.

•

NEW YORK TRAP ROCK CORP., New York, N. Y., according to a report issued by the Securities and Exchange commission, had net sales of $3,301,467 for the year ended December 31, 1938, and the cost of sales was $2,141,096 before providing for depreciation and depletion, leaving a gross profit of $1,160,371. For 1937, the company's sales were $3,415,402 as against $2,208,716 for cost of sales, showing a gross profit of $1,206,686. The net sales reported in 1938 was after allowing $936,344 for freight, towing and handling, and the corresponding net sales in 1937 was after similar allowances of $945,007.

•

PACIFIC PORTLAND CEMENT CO., San Francisco, Calif., proposes to issue $2,969,650 in debentures under the reorganization plan. Debentures would be issued at the rate of $50 par value for each of the 59,393 outstanding preferred stock shares.

•

DEWEY PORTLAND CEMENT CORP., Kansas City, Mo., has registered 100,000 shares $15 par common stock to be offered publicly for the account of certain stockholders. The aggregate amount, $3,000,000, is based upon a maximum offering price of $30 a share. No proceeds will be received by the company.

•

MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, has declared a dividend of $1 a share on the common stock, the first since December, 1937, and regular quarterly disbursements on preferred shares, both payable October 2. Business of the company has been running ahead of 1938 all year, and has increased noticeably in the past two months. The company will also retire $215,000 in bonds on October 1. These are collateral and trust bonds which have been retired at the rate of $220,000 annually. The reduced amount is due to the fact that some of the bonds have been converted into stock.

THE ROSS FEEDER

Completely controls the flow of any size material from Storage Bins, Hoppers or Open-Dump Chutes to Crushers, Conveyors, Screens, etc.

High in efficiency. Low in maintenance and power consumption.

Furnished in sizes to suit your operation. Send full particulars for recommendation.

ROSS SCREEN & FEEDER CO.

19 Rector Street
NEW YORK, U. S. A.

2 Victoria Street
LONDON, S. W. 1., ENGLAND

CANADA CEMENT CO., LTD., Montreal, has issued a call for the redemption on November 1, at 101 of $750,000 first mortgage serial Series A 3 percent bonds. The bonds were to mature on November 1, 1940. This will complete the redemption of this $3,000,000 issue which was used to refund the company's bonded debt in 1936.

Change Ownership

HAWKEYE SAND & GRAVEL CO., Spokane, Wash., is the name of a new company which has taken over the entire sand and gravel business of the Hawkeye Fuel Co. The business was purchased this Spring by Rex Gillogly. Three plants are operated, a large one at Irvin, Wash., for sand and gravel, and two others for plaster sand.

Lime Production Per Company Shows Increase

ALTHOUGH the number of companies manufacturing lime have shown a steady decrease since 1910, the annual output per company has increased, according to a graphic survey of the industry recently compiled by the Bureau of Mines. For example, in 1910, 1073 firms produced more than 3,400,000 tons of lime. Shortly after the close of the World War, the number of firms had dropped to 490, although production had declined very little. In 1925, the banner year, when output totaled nearly 4,600,000 tons, the number of companies had fallen to 399. At the low point of the depression (1932), 311 companies produced about 1,960,000 tons; in 1937, although production had risen to over 4,100,000 tons, the number of companies had declined to 278; and in 1938, with a decline in production to about 3,450,000 tons, the producing companies numbered 284. Conversely, the annual output per company has increased from 3,199 tons in 1910 to 11,785 tons in 1938.

PRICES BID
Contracts Let

BEVERLY, MASS.: Bids on quotations for approximately 20,000 tons of crushed rock were received as follows: Lynn Sand and Stone Co., submitted a price of 80c per ton, at the plant, for 2-in. stone and 85c per ton, at the plant, for 1-in. stone. A price of $1.25 per ton was submitted for delivered stone. Welch and Moynihan Co. submitted a bid of 85c per ton on both sizes, at the plant, and $1.35 per ton, delivered by truck. Malden Crushed Stone Co. submitted prices of 95c per ton at the plant on both sizes and $1.45 per ton delivered by truck.

•

DOVER, OHIO: State Highway Director Robert S. Beightler reported a sharp decrease in prices paid for "hot mix" black road top material. In 1937 the state paid $12.69 per cu. yd. for black top base against $10.75 in 1938 and $8.81 this year. For black top surface, the 1937 price per cu. yd. was $13.52 against $9.76 in 1938 and $8.74 in 1939.

•

PETALUMA, CAL.: Bids have been accepted to furnish materials for construction of the unit of the Thompson creek concrete drain tube. McNear Co. will furnish approximately 400 sacks of cement (in cloth bags) at 72¾c per sack, with an allowance of 10c for each sack returned; while Hein Bros. and the Marin Gravel Co. will furnish the coarse and fine gravel, 300 and 150 tons, at a price of $1.50 and $1.55 per ton, respectively.

•

ALBANY, MO.: E. E. Trenary of Pattonsburg, Mo., is selling agricultural limestone in the south half of Gentry county at $1.55 per ton.

Made of Acid Open Hearth Steel Wire

Round Strand
Flattened Strand
Preformed
Steel Clad
Non-Rotating

The Service Record of this wire rope continues to make and hold friends.

MADE ONLY BY

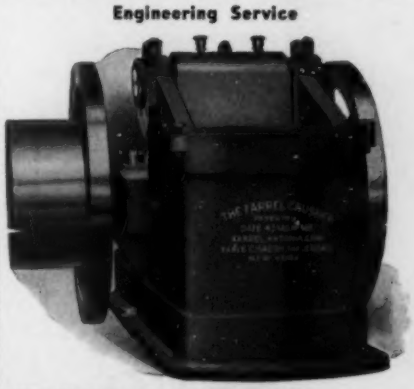
A. LESCHEN & SONS ROPE CO.
Established 1857

5909 Kennerly Avenue St. Louis, Mo.
New York — Chicago — Denver
San Francisco — Portland — Seattle

FARREL BACON CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants.

Engineering Service



EARLE C. BACON, Inc.
17 John St., New York, N. Y.

MANGANESE STEEL CASTINGS

for
CRUSHERS
PULVERIZERS
ROLLS
SCREENS

for
SHOVELS
DREDGES
CRANES
CONVEYORS

The Frog, Switch & Mfg. Co.
Established 1881 CARLISLE, PA.

No Other Crusher Will Work for You Like This

DIXIE NON-CLOG Hammermills and Regular Stationary Breakers are unexcelled for primary, secondary or fine reduction. Note the simple, sturdy swing hammer construction and the specially designed, continually moving breaker plate which is an exclusive DIXIE feature. This is an exceptionally powerful and dependable unit for handling cement rock, clay, shale, silica, sand, gypsum, coal, etc. Made in 40 different sizes.

Write for further details.

DIXIE MACHINERY MFG. CO.

4109 Goodfellow Ave. ST. LOUIS, MO.

HAVE YOU A TOUGH SCREENING PROBLEM?

If so, we may have the answer

We are a SCREENING company with a long and varied experience in the screening field that enables us to correctly analyze and solve most difficulties.

Why not try us? No obligation entailed.

SCREEN EQUIPMENT CO., Inc.

9 LAFAYETTE AVE., BUFFALO, N.Y.

Builders of

SECO

VIBRATING SCREENS

OBITUARIES

WALTER J. ELAM, founder of the Elam Sand & Gravel Co., Rochester, N. Y., the Good Stone Mfg. Co., and well known as an excavating and grading contractor, died August 26, at the age of 72.

•

EDWIN W. RUCKSTUHL, vice-president of the Willey-Ruckstuhl Co., Cincinnati, Ohio, passed away August 25. He was a native of Cincinnati and was 46 years of age.

•

BARTOW COWDEN, secretary-treasurer of the Southern States Portland Cement Co., Rockmart, Ga., died August 12 at the age of 76. He was born in Piedmont, Ala., and in his earlier years was associated with southern railroads. He joined the Southern State Portland Cement Co. in 1906 as secretary, sales manager and traffic manager and in 1929 the title of treasurer was added to his already responsible duties.

•

K. H. WINTHER, superintendent of the National Portland Cement Co., Bethlehem, Penn., died August 18 in Denmark from an attack of influenza. He had been visiting his mother at Copenhagen when he became ill. Mr. Winther was 42 years of age and had been employed by the cement company the past four years. Prior to his affiliation with the National Portland Cement Co. he worked for 15 years as a cement engineer for F. L. Smidth and Co. Mr. Winther has been succeeded by Orla A. Larsen as superintendent of the plant.

•

JOHN WUNDER, president of the Trap Rock Co., Minneapolis, Minn., died July 21. He served for many years on the Board of Directors of the National Crushed Stone Association and also took an active part in other activities of the Association.

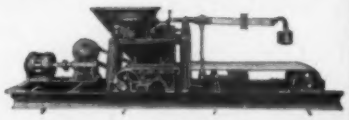
•

NORMAN CRAWFORD, JR., of Florence, Ala., purchasing agent of the Tennessee Valley Sand and Gravel Co., died September 12.

•

HARRY A. TOMLINSON, vice-president of the Sturtevant Mill Co., Boston, Mass., passed away August 1. He was widely known throughout the cement and crushed stone industries. Before becoming vice-president he had occupied the positions of advertising manager, office manager, and sales manager.

PROPORTION BY WEIGHT



WITH POIDOMETERS

Many cement plants are using Poidometers for proportioning raw and finish materials, and also cement and hydrated lime for Masons cement. Poidometers are also being used for feeding materials to grinding mills, and coal to dryers. The Poidometer is self-contained. The scale beam is graduated in pounds or kilos, and can be set at whatever amount of material may be required per foot of belt travel; the gate is then adjusted to suit this weight, and the machine will deliver the pre-determined amount of material with an accuracy of ninety-nine per cent.

Poidometers can be mounted on trucks for moving from one bin to another if desired.

Write for Catalog No. 2 and get complete profit-producing facts!

Schaffer Poidometer Co.

2828 Smallman St. PITTSBURGH, PA.

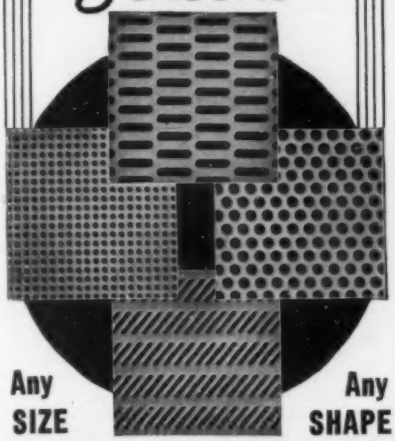
A CHAIN IS NO STRONGER THAN ITS . . . FITTINGS

For that tough job —LAUGHLIN drop forged chain fittings are the answer. LAUGHLIN Shackles, Turnbuckles, Missing Links, Hooks and Swivels have a reputation for quality that is built on performance. ALL LAUGHLIN Fittings are drop forged in a modern plant with the latest precision equipment. Send for catalog.

THE THOMAS LAUGHLIN COMPANY

PORTLAND, MAINE

PERFORATED METAL
Screens



Any SIZE Any SHAPE
Any METAL Any PERFORATION

For vibrating, shaking and trommel screens.

Excellent material and workmanship for good screening results.

The Harrington & King PERFORATING Co.

5650 Fillmore St., Chicago—114 Liberty St., N. Y.

Equip for Economy

WRITE FOR BULLETIN

PYRASTEEL
for high temperatures

COSTS LESS PER HEAT HOUR
when used for:

KILN ENDS
COOLER PLATES
SCREW CONVEYORS
FEED PIPES
CLINKER BUCKETS
and other Cement Mill items

PYRASTEEL for heat resistance
EVANSTEEL for strength and wear

Chicago Steel Foundry Co.
37th Street at Kedzie Ave., Chicago
Makers of Alloy Steels for 30 Years

D. S. HUNKINS, president of the Peerless White Lime Co., St. Louis, Mo., died September 24.

•

MAJ. T. FRANK QUILTY, Naperville, Ill., died recently at the age of 66. He was a former president of the Superior Stone Co., and the Superior Material Co., and also was for many years a contractor in Chicago and at one time assistant city engineer.

Gypsum In Washington

C. A. KEARNEY is reported to have announced that he will undertake exploitation of the estimated 2,000,000-ton deposit of gypsum at Epsom Lake on Whiskey Mountain, ten miles northwest of Tonasket, Wash. It has been stated that Lorin R. Allan, Seattle representative of the Schumacher Wallboard Co., Los Angeles, had obtained samples of the gypsum for analysis.

Doubles Capacity

L. H. CHANDLER, Lomita, Calif., who built a sand and gravel plant in 1937, has increased the capacity to over 100 tons per hour this past summer, nearly double former capacity.

Concrete Pavement Yardage

AWARDS of concrete pavement for August, 1939, have been announced by the Portland Cement Association as follows:

Type of construction	Sq. yds. awarded during Aug.	Total sq. yds. during first eight mos.
Roads	3,907,493	19,850,354
Streets and Alleys	2,253,799	13,301,564
Airports	140,583	559,176
	6,301,875	33,711,094

Sand Lime Brick Production and Shipments

EIGHT active sand-lime brick plants reporting for August and nine for July, statistics for which were published in September.

AVERAGE PRICE FOR AUGUST

	Plant Price	Delivered Price
Detroit, Mich.	.....	$16.00
Madison, Wis.	.....	13.00
Milwaukee, Wis.	$10.00	12.50
Mishawaka, Ind.	11.00	.....
Saginaw, Mich.	10.90	.....

STATISTICS FOR JULY AND AUGUST

	July†	August‡
Production	2,198,650	2,736,165
Shipments (rail)	153,000	241,000
Shipments (truck)	2,570,280	2,732,395
Stock on hand	612,534	1,179,831
Unfilled orders	1,465,000	1,595,000

† Nine plants reporting: incomplete, one not reporting production, two not reporting stock on hand, and four not reporting unfilled orders.

‡ Eight plants reporting, incomplete, one not reporting production, one not reporting stock on hand, and six not reporting unfilled orders.

* *Note: Obsolete Machines cost more to operate than these Modern P&H Excavators.*

P&H Model 855 2 yard Shovel

Where digging depends upon steady operation, P&H all welded construction of alloy steels gives you bigger production with lower costs for yardage and maintenance. Available in sizes up to 5 cu. yds. capacity; Gas, Diesel or Electric Power. Write for literature on the size you need. Harnischfeger Corporation, 4465 West National Avenue, Milwaukee, Wisconsin.

HARNISCHFEGER CORPORATION

News of the Industry

National Industrial Advertisers Association elected Charles McDonough, advertising manager of the Combustion Engineering Co., New York City, president at the 17th annual Conference held at the Hotel New Yorker, New York City, September 20 to 22. The following vice-presidents were elected: Richard P. Dodds, Truscon Steel Co., Youngstown, Ohio; William D. Murphy, Sloan Valve Co., Chicago; Herbert V. Mercready, Magnus Chemical Co., Garwood, N. J.; E. J. Goes, Koehring Co., Milwaukee; Terry Mitchell, Frick Co., Waynesboro, Penn.; and H. S. Van Scoyoc, Canada Cement Co., Ltd., Montreal. Ralph Louis Towne, Surface Combustion Corp., Toledo, Ohio, was elected secretary-treasurer.

Bucyrus-Erie Co., South Milwaukee, Wis., has moved its southern district office from Birmingham, Ala., to Atlanta, Ga.

Whitcomb Locomotive Co., Rochelle, Ill., a subsidiary of the Baldwin Locomotive Works, Philadelphia, has appointed H. V. Huleguard general manager. For several years Whitcomb sales and engineering activities have been concentrated at Philadelphia. These departments have all been transferred to Rochelle.

Hewitt Rubber Co. of Pittsburgh, Pittsburgh, Penn., announces that M. S. Lambert has become associated with them as vice-president and general manager.

R. G. LeTourneau, Inc., Peoria, Ill., has erected an ultra-modern factory building a few miles from Toccoa, Ga., known as the LeTourneau Co. of Georgia, to be used in the manufacture of Tournapulls. It is built on a 2000 acre tract and represents an expenditure of $2,000,000. Steel residences to house the employees and a modern airport a half-mile from the company are also to be built.

Federal Motor Truck Co., Detroit, Mich., announces the appointment of Joseph D. Burke as vice-president in charge of sales. He resigned as director of truck sales, Dodge division of Chrysler Corp. last March.

Brooks Equipment and Mfg. Co., Knoxville, Tenn., have appointed R. S. (Tommy) Tucker as its general sales manager. He was formerly vice-president and general manager of the Good Roads Machinery Corp., Kennett Square, Penn.

"ALL SCREENING MACHINES ARE *the same!*

Probably all this gent needs is some Carter's Little Liver Pills. For every experienced producer well knows that there's a whale of a difference between screening machines. And that's why it pays to rely on Simplicity gyrating units.

Simplicity screens possess a wealth of outstanding features such as counterbalanced eccentric shaft, rubber-mounted screen corners, screens in four-way tension over doubly-crowned surface, dust-sealed Alemite-lubricated roller bearings and extra rugged construction.

Because of their unique design, and because they're built right throughout, Simplicity screens reduce processing costs, help maintain ambitious production schedules and require a minimum of maintenance. Write today for complete facts about Simplicity Gyrating screens for the aggregate Industry.

Simplicity

ENGINEERING COMPANY · DURAND MICH.

New Incorporations

Cape Ann Quarries, Inc., Boston, Mass., and New York, N. Y., has been granted a charter with a capital stock of 5000 shares no par value. Incorporators are Walter Watson, Dorothy A. Hogan and Mae A. Moore.

All American Asbestos Company, Inc., 1545 North Western Avenue, Chicago, Ill., has been granted a charter with a capital of 250 shares par value, common at $100 a share, by G. I. Hunter, O. J. Wellenstein, and Harold F. Stahl.

M. O. Johnson Stone Co., Inc., New Port Richey, Fla., has been granted a charter. Capital is 250 shares, $100 par value, and directors are O. G. Hensley, M. Oelsner, and Alice Hensley.

Houston Concrete Works, Inc., Houston, Tex., has been incorporated by E. S. Dixon, W. B. Dixon, and John A. Dixon. Capital stock is $10,000.

Warrentown Silica Co., Maiden Rock, Wis., has been incorporated. Capital stock is 250 shares at $100 each and incorporators are Joseph Burridge, Francis Bolin, and Peter Krebsbach.

Benton Mining Co., Rogers, Ark., has filed articles of incorporation listing authorized capital of $100,000, of which $51,000 has been subscribed by the incorporators. The capital stock is represented by 1000 shares of $100 each. Incorporators are James L. Lewis and Wm. McLaughlin.

Climax Machine Mould Co., Inc., Buffalo, N. Y., has been granted a charter to manufacture cement building blocks. Capital is $50,000 and incorporator is Lester Beitz, Brisbane Bldg., Buffalo.

Dixie Crushed Stone Co., Bowling Green, Ky., has been incorporated with capital stock of $2000 by Charles E. and Arthur D. Gorman and James C. McClellan.

Blanchard Sand and Gravel Co., Inc., Burlington, Mass., with a capital of $25,000 has been granted a charter. Incorporators are John Kazanjian, Alice Hagopian, and Bertha C. Fogarty.

Air City Concrete Co., Dayton, Ohio., has been granted a charter with a capital of 500 no par value shares. Incorporators are Lena L. Ayres, George A. Heck and Harmon W. Ayres.

Charles Cardona Sand and Gravel Co., Darien, Conn., has been incorporated by R. Gladys Svendsen, Carol A. Buckley and Eleanor L. Brown.

FREE ! New Literature

THE bulletins and catalogs described below are for your benefit. To save you the necessity of writing individual letters, those you want can be obtained by merely checking and mailing the post card on this page.

1 ALLOY STEEL.—Joseph T. Ryerson & Son, Inc., has issued a 144-page pocket size booklet which contains such useful information as metallurgical definitions, heat, hardness, and numerical equivalent tables; weight, dimension, and specific gravity tables; and carbon steel, drill rod, non-ferrous, tubing, sheet, and manufacturing tolerances.

2 BELTING.—United States Rubber Co., Mechanical Goods Division. "Belting Biographies" describes the company's complete line of transmission and conveyor belts and contains useful technical information, including data on the selection of the proper belt, installation, speed of operation, pulley size, tension, and carrying capacity.

3 CAPACITOR-MOTORS.—General Electric Co. Bulletin GEA-2420 gives details of construction and a graphic explanation of this low-cost, constant-speed pump drive.

4 CHAINS AND SPROCKETS.—Webster Manufacturing Co. has issued catalog No. 60-A which illustrates, describes and gives dimensions, strengths and weights of the Webster chains and sprockets.

5 CRANES.—Harnischfeger Corp. has issued a folder about the performance and features of the P & H bantam weight "Switcher Crane," a convertible crane which can also be used to switch freight cars.

6 CRUSHERS, HAMMER.—William Patent Crusher and Pulverizer Co. Bulletin 569 describes and illustrates the Williams "Slugger" crusher and pulverizer and features diagrams of plant layouts using the crusher and photographs of the appearance of various stone sizes produced with it.

7 CRUSHING AND SCREENING EQUIPMENT.—Universal Road Machinery Co. has issued a booklet describing and illustrating its portable and stationary plants and equipment for plant operation—crushers, elevators, screens and conveyors.

8 DUST COLLECTORS.—Pangborn Corp. Folder 2045, "You May Not Notice His Daily Wages" and 2045 "Dust Hogs Have Babies" are the latest in the series of the Pangborn "Dust Hog" campaign to show the value of dust control.

9 FIRST-AID SUPPLIES.—Davis Emergency Equipment Co. A new catalog of the Davis industrial first-aid supplies, forming a handbook of first-aid supplies for general and industrial work, has been issued.

10 MOTOR DRIVES. — Rockwood Manufacturing Co. has issued booklet 861. It illustrates and explains the basic principles underlying the operation of Rockwood pivoted drives for mounting electric motors and gas engines.

11 SPEED CHANGERS. — Allis-Chalmers Mfg. Co. has brought out a 20-page bulletin B 6013 which presents the applications and advantages of the Vari-Pitch speed changer.

12 PUMPS.—Peerless Pump Division has issued a profusely illustrated catalog No. 127A on its oil or water lubricated pumps. The operating mechanism of the various models is clearly presented in colored diagrams. In addition to the complete description of the various models there are twelve pages of useful engineering data.

13 READY-MIXED CONCRETE. — Scientific Concrete Service Corp. A bulletin describes the $(SC)^2$ precision control of concrete manufacture as effected by the Toledo method for accurate control of concrete mixtures.

14 SAFETY EQUIPMENT.—American Optical Co. A new catalog describes in detail the concern's complete line of eye, head, and lung protective equipment and also its new line of safety clothing. Included also is a discussion of safety problems in industry.

15 SCREENS, LIQUID.—Robins Conveying Belt Co. Bulletin No. 107 is about the uses, construction and features of Robins liquid screens, which are said to be designed for three main purposes: to clarify a liquid, to dewater a solid, and to combine these two operations.

16 WIRE ROPE.—Hazard Wire Rope Division, American Chain & Cable Co., Inc., has published a new pocket-sized catalog on wire rope which also contains information of a practical and technical nature.

17 WIRE ROPE.—Macwhyte Co. is distributing reprints of an article which appeared in Steel and which relates the story of making wire rope at the Macwhyte plant.

18 ROCK DRILLS. — Ingersoll-Rand Co. has published a profusely illustrated 88-page catalog which presents the complete line of Ingersoll-Rand rock drills and associated equipment, together with a brief and interesting history of rock drill development and eight pages of engineering tables.

19 RUBBER PRODUCTS. — Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., has brought out the fourth edition of "Manhattan Rubber Products for Industry." In addition to describing the hundreds of mechanical rubber products and special items manufactured, the catalog contains transmission belt engineering data and technical information on other products.

20 SWITCHGEAR CONTROL ACCESSORIES.—Delta-Star Electric Co. Bulletin No. 72-D describes and has seventy control diagrams of the Delta type "M" instrument, control, and auxiliary switches.

21 UTILITY TOOL.—Templeton, Kenly & Co. Bulletin P & P 40 presents the Util-A-Tool at work on pushing, pulling, clamping, bending, spreading, hoisting, and on wheel pulling jobs.

22 VALVES.—Jenkins Bros. "The 'Inside Story' of Jenkins 12-lb. Iron Valves" is a pictorial study of the line of Iron Valve types. As each type is disassembled its features are pointed out.

23 WELDING.—Linde Air Products Co. has available reprints of an article appearing in Oxy-Acetylene Tips about welding Haynes Stellite rod to a shovel edge and the performance of this shovel in comparison with an ordinary steel shovel.

Fill Out Reverse Side—MAIL TODAY

FIRST CLASS
PERMIT NO. 1417
(Sec. 510, P.L. & R.)
CHICAGO, ILL.

BUSINESS REPLY CARD

No Postage Stamp Necessary if Mailed in the United States

—POSTAGE WILL BE PAID BY—

ROCK PRODUCTS

205 WEST WACKER DRIVE

CHICAGO, ILL.

FREE ! *Information on* NEW MACHINERY and Equipment . . . . . .

USE POST CARD BELOW

24 BEARING LUBRICATION.—U. S. Electrical Motors, Inc. Form No. 1048 describes and illustrates in color the U. S. Lubriflush system of motor lubrication. This features a special design of the bearing chambers which is said to permit removal of all sludgy grease when new lubricant is injected.

25 BEARING UNITS.—Stephens-Adamson Mfg. Co. Sealmaster ball bearing flange units, take-up units and complete take-up units in frames are self-aligning bearing units with seals built in as an integral part of the bearing proper, independently of the housing.

26 COMPRESSORS, PORTABLE.—Sullivan Machinery Co. The "Zeph-Air" line of lightweight, portable compressors in capacities of 60 and 85 cu. ft. per minute are so small and compact that the two-wheel mountings can be towed by a pleasure car. Also furnished in skid mounted models.

27 CRUSHER.—Iowa Manufacturing Co., roll crusher with sealed-in roller bearings described in New Machinery and Equipment Section. Each roll shell is made up of seven segments.

28 ELECTRIC EYE CONTROL.—Photoswitch, Inc., is offering the Photoswitch photo-electric control for automatic control of mechanisms and processes. Among the applications are fencing off dangerous machinery, smoke density control, automatic weighing, and conveyor control.

29 EXCAVATOR.—Osgood Co., combination shovel, dragline and crane features bolting on of clutch and brake housings on the drum shaft. Detailed information about this excavator is in New Machinery and Equipment Section.

30 ENGINE.—Wisconsin Motor Corp., light weight, air-cooled gasoline engine with a horsepower range of 2.5 at 1400 r.p.m. to 4.2 at 2400 r.p.m. Illustration and description appear in New Machinery and Equipment Section.

31 FLUE GAS ANALYZER.—Hays Corp. Re-designed automatic flue gas analyzer, or Orstaomat, is smaller, lighter and more compact and features a transparent plastic instead of hard rubber as was formerly used in the tilting analyzing unit.

32 FORGINGS WEIGHT CALCULATOR.—Kropp Forge Co. Handy calculator for rapidly determining the weights of forged square, round, hexagonal and octagonal flats and bars and forged rings and blanks is being offered at a small charge partially to cover the cost of producing and mailing.

33 GAS MASK FACEPIECE.—Mine Safety Appliances Co. All-vision facepiece is standard for all M. S. A. gas masks. Its features are said to provide unrestricted vision, greater comfort, and added efficiency.

34 GEAR SHIFTING GUIDE.—Ford Motor Co., Shiftoguide speedometer tells when it is the proper time to shift gears as conditions vary. Operation of the guide is described in New Machinery and Equipment Section.

35 JACKS.—Buda Co. "Variable Speed" hydraulic jack is said to embody an entirely new application of the hydraulic principle—adjustment of the fulcrum on the lever socket changes the length of stroke of the lever bar, permitting 10, 15, or 20-ton loads.

36 FEEDER.—Syntron Co., small vibrating feeder for dry materials described in New Machinery and Equipment Section.

37 MULTIPLE BELT.—U. S. Electric Motors, Inc. Multiple belt for variable speed drive motors may be tightened or loosened without shifting the entire base. Speed changes on the unit are effected by turning a hand wheel.

38 JACKBIT GRINDER.—Ingersoll-Rand Co. Size J-3 non-automatic jackbit grinder is adaptable for use with all types of standard detachable rock-drill bits and has a capacity of 35 hard bits or 50 annealed bits per hour.

39 PORTABLE ACETYLENE GENERATOR.—Linde Air Products Co. Oxweld MP-9 medium pressure acetylene generator is said to be designed to combine portability with the operating advantages usually found only in larger units. It weighs 25 lb.

40 PORTABLE PNEUMATIC GRINDER.—Independent Pneumatic Tool Co. Rotary air grinder for small-wheel work is 5½ in. long and weighs 18 ounces. It operates at a free speed of 14,000 r.p.m. and uses wheels up to 1½ in. diameter.

41 PUMP.—Allis-Chalmers Mfg. Co., single stage, centrifugal pump equipped with ball bearings described in New Machinery and Equipment Section.

42 PUMP.—Rotary Lift Co. Rota-Radial pump, designed especially for elevator service, is reported to have an efficiency in excess of 85 percent. It is a seven cylinder unit with the cylinders in a circle like an airplane engine. Pistons operate from an eccentric.

43 SHOVEL.—Universal Power Shovel Corp., lightweight ¾-cu. yd. excavator convertible to all attachments described in New Machinery and Equipment Section.

44 SPEED TRANSMISSION UNITS.—Link-Belt Co. A new 40-page booklet No. 1574 has been brought out describing and illustrating the P.I.V. gear. Two new sizes have been included. They are No. 0 size, ½-hp. for speed ratios of 2 to 1 or 3 to 1; and size No. ½, 1½-hp. for ratios of 2 to 1, 3 to 1, and 4 to 1.

45 V-BELTING MADE OF NEOPRENE.—Manheim Mfg. & Belting Co. is manufacturing a line of V-belting made of Neoprene and known as 60-second neoprene V-belt, because of the ease with which it is said to be applied.

46 WELDER.—Lincoln Electric Co., small welder of 200 amp. capacity designed for either belt or direct drive described in New Machinery and Equipment Section.

Detach and Send Us This Post Card ↓

ROCK PRODUCTS, 205 W. Wacker Dr., Chicago, Ill.

I would like to have the items circled.

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45

46

Name ..... (Position) .....

Company .....

Street .....

"Kick the feeder trap wide open ... no overload on the engine"

That's one operator's comment on his Cummins Diesel-powered rock crusher, and he adds, "No matter how much material is going through, the engine doesn't snort and fall back."

Another confirmation of what we've been telling you . . . that the Cummins Diesel's high, flat torque gives it power to hold on without stalling when the crusher takes an extra big bite or a nigger-head misses the grizzley.

This and many other features have given the Cummins Diesel its reputation for dependability. Why not get the whole story from your nearest Cummins Dealer or write direct to Cummins Engine Company, 3816 Wilson Street, Columbus, Indiana.

Portable Cedar Rapids Crushing plant powered with a model HP-600, 85 hp. Cummins Dependable Diesel, crushing gravel for a Maricopa County Highway, Phoenix, Arizona.

CUMMINS Dependable **DIESELS**

Classified Directory of Advertisers

For alphabetical index see page 104

Abrasion Resisting Plates
Frog, Switch & Mfg. Co.

Aerial Tramways
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hazard Wire Rope Co.
Jeffrey Mfg. Co.
Leschen, A. & Sons Rope Co.
Link Belt Co.
Roebling's, John A., Sons Co.

Agitators
Blaw-Knox Co.
Hardinge Co.
Hetherington & Berner, Inc.
Smidth, F. L. & Co.
Traylor Engineering & Mfg. Co.

Air Compressors
Fuller Company
Gardner-Denver Co.
Norberg Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Air Filters
Blaw-Knox Co.
Fuller Company
Hardinge Co.
Northern Blower Co.
Roebling's, John A., Sons Co.
Sly, W. W., Mfg. Co.
Western Precipitation Co.

Air Heaters
Babcock & Wilcox Co.

Air Separators
Babcock & Wilcox Co.
Blaw-Knox Co.
Combustion Engr. Corp.
Hardinge Co.
Link-Belt Co.
Northern Blower Co.
Raymond Pulv. Div.
Sly, W. W., Mfg. Co.
Smidth, F. L., & Co.
Western Precipitation Co.
Williams Patent Crusher & Pulv. Co.

Airveyors
Fuller Company

Alloys (Metal)
Chicago Steel Foundry Co.
Frog, Switch & Mfg. Co.

Arresters, Lightning
General Electric Co.

Ash & Refuse Handling Equipment
Barber-Greene Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Robins Conveying Belt Co.

Asphalt Mixer Regulators
Hetherington & Berner, Inc.

Asphalt Mixing Plants
Hetherington & Berner, Inc.
Koehring Co.
Traylor Engr. & Mfg. Co.

Axles
Eagle Iron Works

Babbit Metal
Dixie Machy. Mfg. Co.
Ryerson, Jos. T. & Sons, Inc.

Backdiggers
Harnischfeger Corp.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.

Backfillers
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
Marion Steam Shovel Co.
Thew Shovel Co.

Bag Cleaning Machines
Link-Belt Co.
Northern Blower Co.
Stearns Mfg. Co.

Bagging Machines
Smidth, F. L., & Co.

Bag Ties
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)

Balers or Bundling Machines (Sack)
Besser Mfg. Co.
Stearns Mfg. Co.

Balls (Grinding)
Babcock & Wilcox Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hardinge Co.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Barges
Chicago Bridge & Iron Co.
Eagle Iron Works

Batchers (Weighing and Measuring Volume)
Besser Mfg. Co.
Blaw-Knox Co.
Fuller Company
Jaeger Machine Co.
Stearns Mfg. Co.

Battery Chargers
General Electric Co.

Bearings (Anti-Friction)
Eagle Iron Works
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.

Bearing Metals
Robins Conveying Belt Co.

Bearings (Roller)
Flexible Steel Lacing Co.
Link-Belt Co.
Robins Conveying Belt Co.

Bearings (Tapered Roller)
Link-Belt Co.

Belt Cutting Machines
Flexible Steel Lacing Co.

Belt Fasteners or Hooks
Armstrong-Bray & Co.
Flexible Steel Lacing Co.
Robins Conveying Belt Co.

Belt Idlers
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Smith Engr. Works

Belting (Conveyor & Elevator)
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Thermoid Rubber Co.

Belting (Transmission)
Bacon, Earle C., Inc.
Link-Belt Co.
Smidth, F. L., & Co.
Thermoid Rubber Co.

Belting (V-Type)
Thermoid Rubber Co.

Belt Lacing
Armstrong-Bray & Co.
Flexible Steel Lacing Co.

Belt Lacing Machine
Armstrong-Bray & Co.

Belt Tighteners
Link-Belt Co.
Robins Conveying Belt Co.

Belt Trippers
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Bin Gates
Austin-Western Road Machinery Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Eagle Iron Works
Fuller Company
Hardinge Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Northern Blower Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Smith Engr. Works
Traylor Engr. & Mfg. Co.

Bins (Storage)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Eagle Iron Works
Hardinge Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Marietta Concrete Corp.
Northern Blower Co.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Bin Indicators
Fuller Company
Merrick Scale Mfg. Co.

Blasting Cap Crimpers
Ensign-Bickford Co.

Blasting Caps (Electric)
Atlas Powder Co.

Blasting Machines
Atlas Powder Co.

Blasting Supplies
Atlas Powder Co.
Ensign-Bickford Co.

Block Machines, Building (Concrete)
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Kent Machine Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Blocks (Pillow)
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Block Racks
Kent Machine Co.

Blocks (Sheave)
Link-Belt Co.
Pioneer Engineering Works
Roebling's, John A., Sons
Sauerman Bros., Inc.

Blowers
Jeffrey Mfg. Co.
Sly, W. W., Mfg. Co.

Boats
Chicago Bridge & Iron Co.

Boats (Self-Unloading)
Link-Belt Co.
Robins Conveying Belt Co.

Boilers
Babcock & Wilcox Co.
Combustion Engineering Co.

Bond Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)

Brick Machines and Molds
Besser Mfg. Co.
Jackson & Church Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Buckets (Clamshell, Crab and Orange Peel)
Blaw-Knox Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Hayward Co.
Jaeger Machine Co.
Link-Belt Co.
Robins Conveying Belt Co.

Buckets (Conveyor & Elevator)
Bacon, Earle C., Inc.
Chicago Steel Foundry Co.
Eagle Iron Works
Jaeger Machine Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Works
Robins Conveyng Belt Co.
Smidth, F. L., & Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Buckets (Dragline & Slackline)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Hayward Co.
Link-Belt Co.
Pioneer Engineering Works
Sauerman Bros., Inc.

Buckets (Dredge & Excavator)
Blaw-Knox Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Hayward Co.

Buckets (Dump)
Dempster Bros., Inc.
Jaeger Machine Co.

Buckets (Tramway)
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)

Building Tile Machines
Besser Mfg. Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Bulk Cement Storage Plants
Blaw-Knox Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Bulldozers
Blaw-Knox Co.
Bucyrus-Erie Co.
Koehring Co.

Bullscrapers
Bucyrus-Erie Co.

Bushings
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.

Cable (Electric)
General Electric Co.

Cableways
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Bucyrus-Erie Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hazard Wire Rope Co.
Leschen, A., & Sons, Rope Co.
Link-Belt Co.
Roebling's, John A., Sons Co.
Sauerman Bros., Inc.

Calcining Equipment
Blaw-Knox Co.
Hardinge Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Capacitators
General Electric Co.

Capstans
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Car Dumpers
Eagle Iron Works
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Car Pullers & Movers
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Cars (Industrial, Quarry, Dump, Concrete, Block, etc.)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Bethlehem Steel Co.
Chase Foundry & Mfg. Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Eagle Iron Works
Link-Belt Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.
Traylor Engr. & Mfg. Co.

Car Wheels
Bethlehem Steel Co.
Chase Foundry & Mfg. Co.
Eagle Iron Works
Link-Belt Co.

Carts
Blaw-Knox Co.
Jaeger Machine Co.
Link-Belt Co.
Robins Conveying Belt Co.

Castings
Babcock & Wilcox Co.
Bacon, Earle C., Inc.
Bethlehem Steel Co.
Blaw-Knox Co.

Greater Stability

of Gulf quality oils

SHOWS UP in long-time service!

Slight differences in oil quality become magnified in service, having profound effect on wear of moving parts and ultimate maintenance expense!

TWO lubricants may be manufactured to look alike, and to meet the same specifications—but that's no guarantee they will perform alike! One may retain its lubricating qualities under severe temperature and load conditions, while the other may depreciate and allow friction to take a heavy toll in wear and maintenance expense.

These variables in characteristics of lubricants are being studied each day in the Gulf laboratories by a large staff of qualified technologists. Through this exhaustive research, Gulf has developed lubricants with performance qualities which can not be predicted from the usual inspection tests.

You can tell the difference when you use them! Their greater stability shows up in long-time service. Under severe operating conditions they prove their endurance and resistance to decomposition. Plant engineers report better operation from their equipment after it has been checked over by an experienced Gulf lubrication engineer and his recommendations adopted for the proper application of improved lubricants.

To evaluate the importance of certain differences between lubricants, Gulf research technologists do experimental work with this sleeve bearing which has been made with a tolerance of less than 1/10,000 of an inch, and might be considered a perfect bearing. Faults in its construction have been eliminated in order that results may not be confused by secondary effects of such faults.

Every public utility, railroad, industrial and marine operator from Maine to Texas can have the benefit of this cost-reducing lubrication service. More than 1100 Gulf warehouses in 30 states make these higher quality oils and greases quickly available to you. Write or phone your nearest distributing point today . . . Gulf Oil Corporation—Gulf Refining Company, Gulf Building, Pittsburgh, Pa.

Maintenance Costs REFLECT Oil Quality

The superintendent of a large Diesel power plant says: "We're saving $350.00 per month—sliced from our maintenance bill since we accepted this Gulf engineer's recommendations and placed Gulf's higher quality Diesel oils in service."

Small Diesel plant superintendent says: "We've reduced maintenance costs 66⅔% since we adopted Gulf's higher quality Diesel lubricants. Now we are able to run through a whole summer season without any of the operating troubles we previously experienced."

GULF INDUSTRIAL LUBRICATION

A COMPLETE LINE OF MORE THAN 400 OILS AND GREASES FOR INDUSTRY

"THE TWO MOST HELPFUL ARTICLES IN YEARS"

—Applauds a long time ROCK PRODUCTS Subscriber

★ ★

and he is not alone in his enthusiasm—the articles he refers to have created a sensation in the industry, they are BIG NEWS of tremendous importance to every progressive Crushed Stone and Sand and Gravel Producer.

They are now running in every issue of ROCK PRODUCTS—two of the most timely and extraordinary series we have ever published: *"Crushing, Sizing, Testing* and *Specifying Aggregates,"* by Elwood T. Nettleton and the equally important *"Washing* and *Classifying Sand,"* by Edmund Shaw.

These exceptionally well qualified writers offer you thoroughly practical methods of meeting the puzzling problems of specifications in accord with the exacting demands of government, engineers and individuals.

Read the installments of these two great series in this issue. If there are men in your organization who are not reading ROCK PRODUCTS regularly, you should see that they begin doing so NOW!

ROCK PRODUCTS
205 W. Wacker Drive
Chicago, Illinois

Remittance Enclosed ☐ *Bill, I will remit later* ☐

Send ROCK PRODUCTS to address below for ☐ 2 yrs. at $3.00; ☐ 1 yr. at $2.00. (Check which.) We want to benefit from the series of Crushed Stone and Sand and Gravel Articles now running.

Name.....

Street.....

City.....State.....

Company.....Title.....

CAN YOU AFFORD TO MISS THIS WEALTH OF USABLE INFORMATION

If you are not a regular reader of ROCK PRODUCTS you are passing up a great investment service designed to fit your individual need.

THIS FORM MAKES ORDERING SIMPLE

Classified Directory (Cont.)

Chicago Steel Foundry Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Frog, Switch & Mfg. Co.
Hardinge Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Cement Colors
Mepham, Geo. S., Corp.

Cement Plants
Hardinge Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
Smidth, F. L., & Co.

Central Mixing Plants (Concrete)
Blaw-Knox Co.
Jaeger Machine Co.

Chain (Conveyor & Elevator)
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Chain (Dredge & Shovel)
Bucyrus-Erie Co
Jeffrey Mfg. Co.
Link-Belt Co.

Chimney Block Machine & Molds
Besser Co.
Multiplex Concrete Machy. Co.

Chutes (Bin, Concrete, etc.)
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Eagle Iron Works
Fuller Co.
Hardinge Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Northern Blower Co.
Pioneer Engineering Works
Robins Conveying Belt Co
Ross Screen & Feeder Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Chute Liners
Bacon, Earle C., Inc.
Frog, Switch & Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Circuit Breakers
General Electric Co.

Circuit Testers
Atlas Powder Co.
General Electric Co.

Clarifiers
Hardinge Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Classifiers
Blaw-Knox Co.
Eagle Iron Works
Hardinge Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Machy. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Northern Blower Co.
Pioneer Engineering Works, Inc.
Raymond Pulverizer Div.
Research Corp.
Simplicity Engineering Co.
Sly, W. W., Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg Co.
Universal Vibrating Screen Co.
Western Precipitation Co.
Williams Patent Crusher & Pulv. Co.

Clutches
Jeffrey Mfg. Co.
Link-Belt Co.

Coal Pulverizing Equipment
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Hardinge Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Concrete Mixers
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Kent Machine Co.
Koehring Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Controllers (Electric)
General Electric Co.

Converters (Electric)
General Electric Co.

Conveyor Idlers & Rolls
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Conveyors (Apron)
Barber-Greene Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Conveyors (Belt)
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Chicago Steel Foundry Co.
Fuller Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Machy. Co.
Pioneer Engineering Works, Inc.
Robins Conveying Belt Co.
Smidth, F. L., Co.
Smith Engineering Works
Stearns Mfg. Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Conveyors (Drag-Chain)
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Pan)
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Pneumatic)
Fuller Co.
Northern Blower Co.
Raymond Pulverizer Div.

Conveyors (Portable)
Austin-Western Road Machy. Co.
Barber-Greene Co.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engineering Works, Inc.
Robins Conveying Belt Co.

Conveyors (Screw)
Besser Mfg. Co.
Eagle Iron Works
Hardinge Co.
Northern Blower Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Trolley)
Jeffrey Mfg. Co.
Link-Belt Co.
Stearns Mfg. Co.

Conveyors (Vibrating)
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

NEW INFORMATION ON

TELLURIUM CABLE

SEND COUPON

GEA-2989

GEA-2988

THESE new books should prove useful to every man who has anything to do with cable splicing. GEA-2988. Much of this bulletin is devoted to instructions for splicing tellurium-rubber-sheathed cable, which is widely used for parkway and similar jobs. It also covers braided cable, both rubber and varnished-cambric, as well as certain other types of parkway cable.

GEA-2989. This book gives instructions for splicing and vulcanizing all the principal types of tellurium-rubber-jacketed portable cable.

The instructions are clearly written and are made easy to follow by detailed drawings. Much of the data is brand new. Thus, these books may contain many helpful, money-saving tips for you. Send for a copy of either or both. Address the nearest G-E sales office or mail the coupon direct to General Electric, Department 6G-201, Schenectady, N. Y.

General Electric Co., Dept. 6G-201
Schenectady, N. Y.

Please send me a copy of:

☐ *GEA-2988 Nonleaded cable*
☐ *GEA-2989 Portable cable*

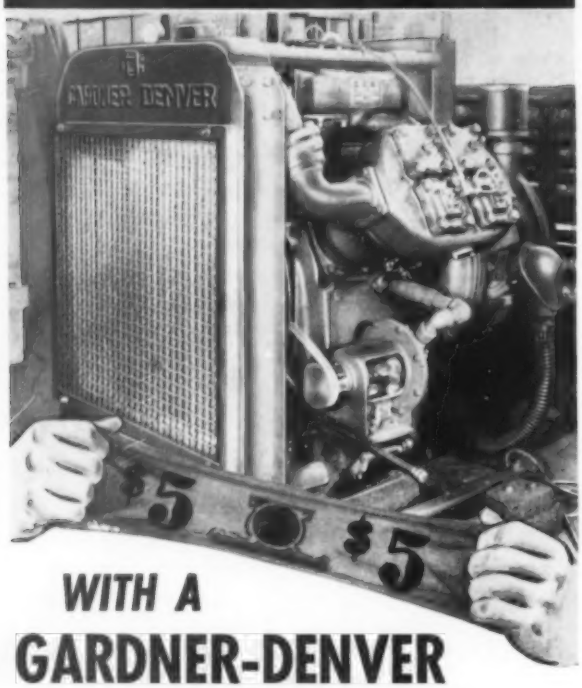
Name .....
Company .....
Address .....

6G9-172

GENERAL ELECTRIC INSULATED CABLE
ALWAYS THE RIGHT TYPE FOR EACH JOB

GENERAL ELECTRIC

MAKING A $5 BILL STRETCH OVER 3½ YEARS—



WITH A GARDNER-DENVER "WB" STATIONARY COMPRESSOR

● Here's a stationary compressor that really puts elastic into five dollar bills. The total repair costs on this Gardner-Denver WBQ Stationary Compressor were only $5.40—and yet it was on duty for over three and one-half years, giving smooth, efficient, trouble-free service.

The compressor is working in the Godiva Mine in Eureka, Utah. It is directly connected to a 50 h.p., 900 r.p.m., GE motor. Mr. Clark, the operator of the mine, reports that this compressor has averaged 26 full working days each month for the past three and one-half years and has caused no trouble whatsoever.

YOU can get dependable, economical service like this—once you've installed a Gardner-Denver WB Stationary Compressor. And every day of operation will save you money in freedom from repair bills—in smooth, efficient operation. Get the complete facts about these money-saving compressors—write us today. Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER 80th ANNIVERSARY YEAR

Classified Directory (Cont.)

Coolers
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Coolers (Clinker)
Fuller Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Correcting Basins
Smidth, F. L., & Co.

Cottrell Precipitators
Research Corp.
Western Precipitation Co.

Couplings (Flexible & Shaft)
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Cranes (Diesel, Electric, Gasoline, Steam)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.
Marion Steam Shovel Co.
Northwest Engineering Co.
Thew Shovel Co.

Cranes (Overhead Traveling)
Harnischfeger Corp.

Cranes (Tractor)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.

Cranes (Truck)
Harnischfeger Corp.
Link-Belt Speeder Corp.
Thew Shovel Co.

Crawler Attachments
Harnischfeger Corp.
Link-Belt Co.

Crawling Tractor Excavators
Austin-Western Road Machy. Co.
Koehring Co.
Link-Belt Co.
Thew Shovel Co.

Crusher Parts
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Frog, Switch & Mfg. Co.
Jeffrey Mfg. Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Traylor Engr. & Mfg. Co.

Crushers (Cone)
Nordberg Mfg. Co.

Crushers (Hammer)
American Pulverizer Co.
Austin-Western Road Machy. Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Dixie Machinery Mfg. Co.
Hardinge Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw & Gyratory)
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co.
Hardinge Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Rogers Iron Wks. Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Crushers (Laboratory)
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co
Hardinge Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Primary Breakers)
McLanahan & Stone Corp.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers Reduction
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
McLanahan & Stone Corp.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Hardinge Co.
Jeffrey Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Roll)
American Pulverizer Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Eagle Iron Works
Hardinge Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushing Rolls
Austin-Western Road Machy. Co.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Rogers Iron Wks. Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushing & Screening Plants (Portable)
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Blaw-Knox Co.
Dixie Machy. Mfg. Co.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Rogers Iron Wks. Co.
Smith Engr. Works
Traylor Engr. & Mfg. Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Curing Racks
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Dedusters
Blaw-Knox Co.
Western Precipitation Co.

Dehydrators
Pioneer Engineering Works, Inc.

Derricks
Harnischfeger Corp.
Hayward Co.

Detonators
Atlas Powder Co.
Ensign-Bickford Co.

MANY SAVINGS REALIZED IN MODERNIZING SLY DUST FILTER

5 WAYS A CEMENT COMPANY SAVED

1. Achieved greater accessibility to filter
2. Saved space required for installation
3. Improved the shaking action for dust removal
4. Facilitated replacement of any bag without disturbing filter assembly
5. Greatly increased efficiency of filter while making substantial savings in operation.

You, too, may have an old dust filter which you want to bring up to date and make more profitable as did a prominent cement company.

This firm had a Sly Dust Filter purchased in 1930. By modernization they accomplished many savings as shown herewith.

Their unit consisted of a 32' long Sly Dust Filter. By installing new style filter parts in only 15 feet of their old case, they increased the effective cloth area by 12%. The balance of the case was converted into a classifier or settling chamber, resulting in a large percentage of the dust being precipitated without actually getting into the filter cloth section. This increases the efficiency of the filter, prolongs the life of the bags, and reduces the static resistance to the flow of air, thereby keeping the power at the fan down to an absolute minimum. The new automatic timing equipment for proper shaking of the bags helps keep their dust control equipment operating at maximum efficiency.

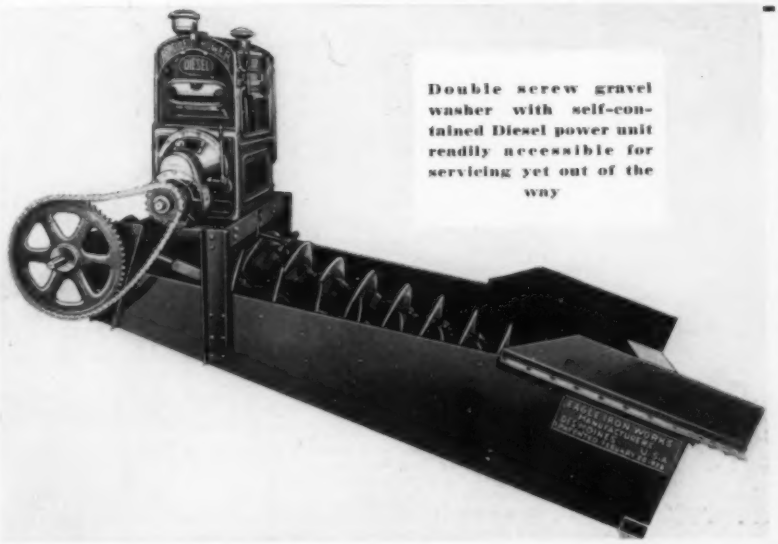
It really does *not* pay to operate an old dust filter. Let us demonstrate the savings of modernization.

THE W. W. SLY MANUFACTURING CO.

4746 TRAIN AVENUE ★ BRANCH OFFICES IN PRINCIPAL CITIES ★ CLEVELAND, OHIO

Introducing the NEW EAGLE *Diesel-Powered Gravel Washer*

Better Washing at Lower Cost



Double screw gravel washer with self-contained Diesel power unit readily accessible for servicing yet out of the way

This sensational new EAGLE washer gives you all the advantages of EAGLE IRON WORKS' 16 years of experience in building aggregates washing equipment plus the economies of Diesel power.

The sectional spiral screws draw the aggregates to the center of the tub and convey them upward to the discharge end, at the same time thoroly scrubbing. Wash water inlets arranged along the tub bottom between the two screws, carry foreign material to the surface where it is washed out with overflow water at lower tub end. Timken roller bearings carry the upper shaft ends, taking downward thrust, and cutless rubber bearings are used at the lower ends of the shafts which are subject to abrading action of the dirty water.

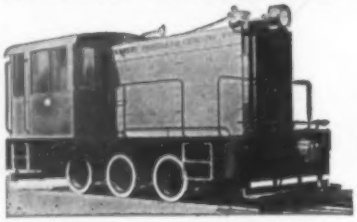
Power is furnished by a Hercules 4-cylinder Diesel power unit Model DOOB, 3¾ in. bore by 4 in. stroke and is completely self-contained.

For further details, write

EAGLE IRON WORKS

DES MOINES, IOWA

HAULAGE SAVINGS Mean More Than Ever Before AND DAVENPORT INDUSTRIAL LOCOMOTIVES Give them to you



Your engineers will approve every modern detail of the fuel saving, stamina-built Davenport Locomotives. Your operators will enthuse over the flexible, smooth performance and easy handling. Your profit sheet will reflect the economies inherent in Davenport's dependable, low cost performance through many years.

Whatever your needs—2½ to 100 tons—there's a Davenport exactly suited to your service. Our engineers will gladly analyze your requirements and submit dependable recommendations without the slightest obligation.

DAVENPORT LOCOMOTIVE WORKS (A Division of Davenport Besler Corporation), Davenport, Iowa.

Write TODAY for Descriptive Catalog

PLANT AND MAIN OFFICE—DAVENPORT, IOWA
New York and Export Office—30 Church St.
Cable Address "Brosites"

DAVENPORT LOCOMOTIVE WORKS

GASOLINE • DIESEL • STEAM
DIESEL ELECTRIC • GAS ELECTRIC

As a matter of fact this feature is standard equipment and does not cost more. It is especially desirable where the bucket handles loose granular materials because it keeps lubrication in and dirt out. This and many other desirable features of Blaw-Knox Buckets is fully described and illustrated in Bulletin No. 1606. Write for it today.

17

BLAW-KNOX Digging and Rehandling BUCKETS
BLAW-KNOX DIVISION of BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

Classified Directory (Cont.)

Dewatering Equipment
Eagle Iron Works
Hardinge Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Diaphragms (Rubber)
Jaeger Machine Co.

Dippers & Teeth (Dredge & Shovel)
Bucyrus-Erie Co.
Frog, Switch & Mfg. Co.
Harnischfeger Corp.
Koehring Co.
Link-Belt Co.
Marion Steam Shovel Co.
Thew Shovel Co.

Disintegrators
Smidth, F. L., & Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Link-Belt Co.
Marion Steam Shovel Co.

Dragline & Cableway Excavators
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Harnischfeger Corp.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.
Marion Steam Shovel Co.
Northwest Engineering Co.
Pioneer Engr. Works, Inc.
Sauerman Bros., Inc.
Thew Shovel Co.

Dredge Cutter Heads & Ladders
Bucyrus-Erie Co.
Eagle Iron Works
Hetherington & Berner, Inc.

Dredge Hulls
Chicago Bridge & Iron Co.
Eagle Iron Works

Dredges
Bucyrus-Erie Co.
Eagle Iron Works
Hayward Co.
Hetherington & Berner, Inc.
Link-Belt Co.
Marion Steam Shovel Co.

Dredge Sleeves
Hetherington & Berner, Inc.
Thermoid Rubber Co.

Drilling Accessories
Bucyrus-Erie Co.
Gardner-Denver Co.

Drill Bits
Bucyrus-Erie Co.

Drill Sharpening Machines
Bucyrus-Erie Co.
Gardner-Denver Co.

Drills (Blast Hole)
Bucyrus-Erie Co.
Gardner-Denver Co.

Drills (Hand Hammer)
Gardner-Denver Co.

Drills (Rock)
Bucyrus-Erie Co.
Gardner-Denver Co.
Jeffrey Mfg. Co.

Drill Steel
Bethlehem Steel Co.
Gardner-Denver Co.

Drills (Wagon)
Gardner-Denver Co.

Drills (Well)
Bucyrus-Erie Co.

Drives (Belt Chain & Rope)
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Short-Center)
Bacon, Earle C., Inc.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Worm)
Link-Belt Co.

Dryers
Babcock & Wilcox Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Combustion Engr. Co.
Hardinge Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Western Precipitation Co.
Williams Patent Crusher & Pulv. Co.

Dust Arrestors
Blaw-Knox Co.
Research Corp.
Western Precipitation Co.

Dust Collecting Systems
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Northern Blower Co.
Raymond Pulverizing Div.
Research Corp.
Sly, W. W., Mfg. Co.
Smidth, F. L., & Co.
Western Precipitation Co.

Dust Collecting Bags
Blaw-Knox Co.
Sly, W. W., Mfg. Co.

Dust Conveying Systems
Blaw-Knox Co.
Fuller Co.
Raymond Pulverizer Div.
Research Corp.
Sly, W. W., Mfg. Co.
Western Precipitation Co.

Dust Precipitators
Research Corp.
Western Precipitation Co.

Dust Recovery Plants
Research Corp.
Western Precipitation Co.

Dynamite
Atlas Powder Co.

Electric Cables
General Electric Co.

Electric Motors
General Electric Co.
Harnischfeger Corp.
Hayward Co.

Electric Motor Starters
General Electric Co.

Elevators
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Chicago Steel Fdry. Co.
Eagle Iron Works
Fuller Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Kent Machine Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Machy. Co.
Pioneer Engineering Works, Inc.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Smidth, F. L., & Co.
Smith Engineering Works
Stearns Mfg. Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engineers (Designing & Consulting)
Bacon, Earle C., Inc.
Blaw-Knox Co.
Fuller Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Merrick Scale Mfg. Co.
Northern Blower Co.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engines (Diesel, Gas, Kerosene & Oil)
Caterpillar Tractor Co.
Cummins Engine Co. (Diesel)
National Supply Co. (Diesel)
Nordberg Mfg. Co.
Superior Diesel

Crush "One Man" Size Rock to 1¼"–¾" or Agricultural Limestone in One Operation . . .

CUTAWAY VIEW of "Slugger" showing heavy duty hammers, liners and discs.

The WILLIAMS "SLUGGER" CRUSHER AND PULVERIZER

By reducing large rock to 1¼", ¾" or agricultural size in one operation, the "Slugger" has enabled operators to produce these sizes at a low cost per ton and with small investment.

Features include—Manganese Steel Hammers, Heavy Duty Bearings, Adjustable Breaker Plate, Hammer adjustments overcome wear, Economical to operate.

The "Slugger" is built in Seven Sizes—from 30 to 150 horsepower —write for illustrative bulletins today.

The Williams Patent Crusher and Pulverizer Co.
800 St. Louis Ave., St. Louis, Mo.

SALES AGENCIES
CHICAGO 37 W. VanBuren | NEW YORK 15 Park Row | OAKLAND, CALIF. 1629 Telegraph Ave.

Williams
OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD
PATENT CRUSHERS GRINDERS SHREDDERS

TY-ROD SCREEN

U. S. PATENT NO. 2,024,906

NO. 9443 TY-ROD for HIGH-CAPACITY SCREENING NO. 9424 TY-ROD

Ty-Rod Avoids Blinding!

for DAMP, STICKY, FIBROUS and SLOW-SCREENING MATERIALS

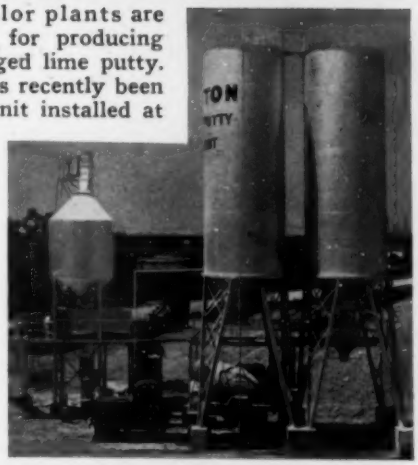
The W. S. **TYLER** Company
CLEVELAND, OHIO
Manufacturers of
WOVEN WIRE SCREEN, SCREENING MCHRY., DRYING, SCRUBBING AND SIEVE TESTING EQUIPMENT
NO. 0381 TY-ROD

The BROOKS-TAYLOR Lime Putty Plant

Brooks-Taylor plants are complete units for producing and handling aged lime putty. A third tank has recently been added to this unit installed at Indianapolis.

Why not supply your customers with ready mixed mortar and aged lime putty for plaster and stucco?

Write for information on an installation to meet your needs.



CHICAGO BRIDGE & IRON COMPANY

Chicago	2452 Old Colony Bldg.	Tulsa	1650 Hunt Bldg.
New York	3396-165 Broadway Bldg.	Houston	2919 Main Street
Cleveland	2265 Rockefeller Bldg.	Philadelphia	1651-1700 Walnut St.
Detroit	1553 Lafayette Bldg.	Boston	1564 Consol. Gas Bldg.
Dallas	1487 Liberty Bank Bldg.	San Francisco	1093 Rialto Bldg.
Birmingham	1505 N. 50th Street	Los Angeles	1458 Wm. Fox Bldg.

Plants at BIRMINGHAM, CHICAGO and GREENVILLE, PA.

Another Progressive Bulk Product Firm "Goes More Modern" via Marietta

They Installed 4 "Built-to-Endure" Marietta Concrete Storage Bins - -

For 100% Efficient Handling of Stone Aggregate for Hot Mix

As pictured here, Clinton Construction Co., Melvin, O., now have the "very last word" storage system—Built-to-Endure, to their SPECIAL needs, by Marietta . . . Stops material waste. Ends bin fire hazard and depreciation. Lightens labor and cost. Improves plant appearance. Lowers insurance. Out-shines old method competition. All of which SPELLS "bigger, better business and PROFITS" . . . Let's discuss YOUR storage problem. Our Engineers await your invitation—no obligation.

THE MARIETTA CONCRETE CORP.
MARIETTA, OHIO
Baltimore, Md. Scotia, N. Y.

MARIETTA CONCRETE STORAGE SYSTEMS

There is only one DUMPSTER It's DEMPSTER

Model "BG" (Below Grade), is only one of the many types of Hoisting Units mounted on trucks for handling detachable buckets included in the DUMPSTER line.

Model "BG" is equipped to lift loaded buckets from 30 ft. below grade.

Detachable Buckets are furnished in sizes from 1 cu. yd. to 6 cu. yds. capacity, in Drop-Bottom and Water-Tight Types.

DEMPSTER BROS., INC.
KNOXVILLE TENNESSEE

There is a Dealer near you

Classified Directory (Cont.)

Engines (Steam)
Nordberg Mfg. Co.

Exhausters
Combustion Engr. Co.
Raymond Pulverizer Div.

Explosives
Atlas Powder Co.

Fans
Blaw-Knox Co.
General Electric Co.
Jeffrey Mfg. Co.
Northern Blower Co.
Sly, W. W., Mfg. Co.
Smidth, F. L., & Co.

Feeders
Babcock & Wilcox Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Blaw-Knox Co.
Fuller Co.
Hardinge Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Kent Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Merrick Scale Mfg. Co.
Northern Blower Co.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Schaffer Poidometer Co.
Smidth, F. L., & Co.
Smith Engineering Works
Stearns Mfg. Co.
Traylor Engr. & Mfg. Co.

Filter Cloth
Northern Blower Co.
Roeblings, John A., Sons Co.
Tyler, W. S., Co.

Fly Ash Collectors
Research Corp.
Western Precipitation Co.

Forges
Gardner-Denver Co.

Forgings
Bacon, Earle C., Inc.
Laughlin, Thomas, Inc.

Frogs & Switches
Frog, Switch & Mfg. Co.

Fuels (Diesel)
Texas Co.

Fume Collectors
Research Corp.
Western Precipitation Co.

Furnaces (Heat Treating, Electric)
General Electric Co.

Fuse Cutouts
General Electric Co.

Fuse Cutters
Ensign-Bickford Co.

Fuse Lighters
Ensign-Bickford Co.

Fuses (Detonating & Safety)
Atlas Powder Co.
Ensign-Bickford Co.

Fuses (Electric)
General Electric Co.

Galvanometers
Atlas Powder Co.
General Electric Co.

Gasoline
Gulf Refining Co.
Texas Co.

Gas Producers
Blaw-Knox Co.

Gas Scrubber
Research Corp.
Western Precipitation Co.

Gear-Motors
General Electric Co.
Link-Belt Co.

Gears
Bacon, Earle C., Inc.
Frog, Switch & Mfg. Co.
General Electric Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Generator & Motor Generator Sets
General Electric Co.
Harnischfeger Corp.
National Supply Co. (Diesel)
Nordberg Mfg. Co.
Superior Diesel

Glass Sand Equipment
Lewistown Fdry. & Mach. Co.

Gloves
Sly, W. W., Mfg. Co.

Grapples
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.
Owen Bucket Co.

Grating
Blaw-Knox Co.
Eagle Iron Works

Grease
Bacon, Earle C., Inc.
Gulf Refining Co.
Texas Co.

Grease Cups
Link-Belt Co.
Robins Conveying Belt Co.

Guards (Lamp)
Flexible Steel Lacing Co.

Guards (Machinery)
Harrington & King Perf. Co.
Tyler, W. S., Co.

Guns
Hetherington & Berner, Inc.

Gypsum Plants
Traylor Engr. & Mfg. Co.

Hangers, Anchors & Inserts (Concrete)
Jeffrey Mfg. Co.
Link-Belt Co.

Haulage Systems (Electric)
General Electric Co.
Jeffrey Mfg. Co.

Haulage Systems (Remote Control)
Dempster Bros.
General Electric Co.
Koehring Co.

Helmets
Sly, W. W., Mfg. Co.

Hoists (Chain, Electric, Skip, Portable, Air, etc.)
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Commercial Shearing & Stamping Co.
Eagle Iron Works
Gardner-Denver Co.
Harnischfeger Corp.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Northwest Engineering Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Sauerman Bros., Inc.
Smith Engineering Works
Stearns Mfg. Co.
Traylor Engr. & Mfg. Co.

Hoppers
Austin-Western Road Machy Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Merrick Scale Mfg. Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Traylor Engr. & Mfg. Co.

Hose (Air, Drill, Water, Steam, Sand Suction & Discharge)
Dixie Machinery Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Sly, W. W., Mfg. Co.
Thermoid Rubber Co.

Hose (Sand Blast)
Sly, W. W., Mfg. Co.

Hydrators
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Co.
Traylor Engr. & Mfg. Co.

Jigs (Sand & Gravel)
Hardinge Co.
Traylor Engr. & Mfg. Co.

Joists & Slab Machines (Concrete)
Besser Mfg. Co.

Kiln Burners
Babcock & Wilcox Co.
Smidth, F. L., & Co.

Kiln Chain Systems
Smidth, F. L., & Co.

Kiln Liners
Hardinge Co.
Traylor Engr. & Mfg. Co.

Classified Directory (Cont.)

Kiln Parts
Blaw-Knox Co.
Chicago Steel Foundry Co.
Hardinge Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Kilns (Rotary)
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Kilns (Shaft)
Hardinge Co.

Kilns (Vertical)
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Co.

Kominuters
Smidth, F. L., & Co.

Laboratory Apparatus
Smidth, F. L., & Co.

Lift Trucks
Besser Mfg. Co.
Stearns Mfg. Co.

Light Plants
Harnischfeger Corp.

Lime Handling Equipment
Chicago Bridge & Iron Co.
Combustion Engr. Corp.
Fuller Co.
Hardinge Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Raymond Pulv. Div.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Lime Plants
American Pulv. Co.
Blaw Knox Co.
Chicago Bridge & Iron Co.
Hardinge Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Lme Putty Plants
Chicago Bridge & Iron Co.

Loaders (Boat)
Fuller Co.
Link-Belt Co.

Loaders (Box Car)
Barber-Greene Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Loaders (Car, Truck, Bin & Hopper)
Barber-Greene Co.
Besser Mfg. Co.
Bucyrus-Erie Co.
Fuller Co.
Gardner-Denver Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Stearns Mfg. Co.

Loaders (Underground)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.
Nordberg Mfg. Co.
Thew Shovel Co.

Locomotive Stack Netting
Tyler W. S., Co.

Locomotives (Diesel-Electric)
Davenport-Besler Corp.
Lima Locomotive Works (Loco. Div.)

Locomotives (Electric, Trolley & Storage Battery)
Davenport-Besler Corp.
General Electric Co.
Jeffrey Mfg. Co.
Lima Locomotive Works, Inc. (Loco. Div.)

Locomotives (Gasoline & Gas-Electric)
Davenport-Besler Corp.
General Electric Co.
Jeffrey Mfg. Co.
Lima Locomotive Wks., Inc. (Loco. Div.)

Locomotives (Kerosene)
Lima Locomotive Works, Inc. (Loco. Div.)

Locomotives (Oil & Oil-Electric)
General Electric Co.

Locomotives (Steam)
Davenport-Besler Corp.
Lima Locomotive Works, Inc. (Loco. Div.)

Lubricants
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co.

Machine Shop Equipment
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Magnetic Separators
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Magnets
General Electric Co.

Manganese Steel Parts
Bacon, Earle C., Inc.
Dixie Machy. Mfg. Co.
Frog, Switch & Mfg. Co.

Manhole Block Machines (Concrete)
Stearns Mfg. Co.

Material Handling Equipment
Austin-Western Rd. Machy. Co.
Barber-Greene Co.
Fuller Co.
Hardinge Co.
Harnischfeger Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Raymond Pulv. Div.
Robins Conveying Belt Co.

Measuring Devices
Blaw-Knox Co.
Fuller Co.
Hardinge Co.
Jaeger Machine Co.
Schaffer Poidometer Co.

Mechanical Rubber Goods
Thermoid Rubber Co.

Mill Liners
Babcock & Wilcox Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Dixie Machy. Mfg. Co.
Hardinge Co.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Mill Parts
Blaw-Knox Co.
Hardinge Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Mills, Grinding (Ball, Compartment, Emery, Hammer, Pug, Rod, Roll, Tube, etc.) (See Pulverizers also)
American Puverizing Co.
Babcock & Wilcox Co.
Dixie Machinery Mfg. Co.
Hardinge Co.
Jackson & Church Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Machy. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Mortar Mixers
Eagle Iron Works
Jaeger Machine Co.

Nails
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)

Nozzles (Sand Blast)
Sly, W. W., Mfg. Co.

Nozzles (Washing)
Link-Belt Co.

Nuts
Bethlehem Steel Co.

Oil Burners
Smidth, F. L., & Co.

Oils (Cutting)
Texas Co., The

Oils (Lubricating)
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co., The

Outdoor Lighting Equipment
General Electric Co.

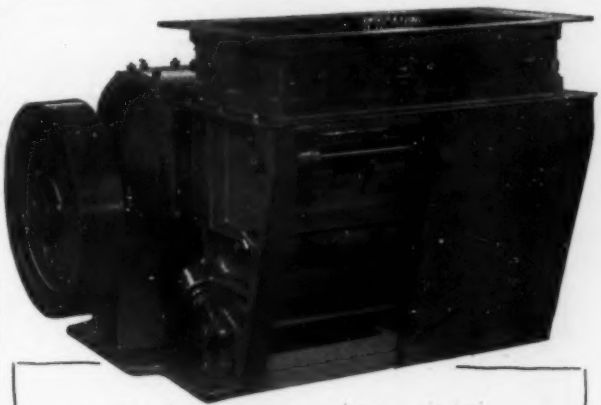
Packing
Thermoid Rubber Co.

NORBLO Fans are especially adapted for solving dust collecting and air handling problems.

Each fan is subjected to a careful inspection and can be relied upon to give satisfactory service for years under most severe conditions. Expert workmanship and only the best material is used in the manufacture of NORBLO fans.

Write today for complete details on NORBLO Texrope Driven Fan, NORBLO Bag Type Dust Arresters and NORBLO Air Filters.

THE NORTHERN BLOWER COMPANY
6409 BARBERTON AVENUE CLEVELAND, OHIO



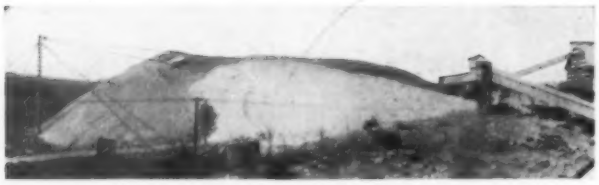
Take a Tip from
AMERICAN!

Here is a powerful crushing unit into which we have built all the features which 30 years of experience have found to be necessary for all-round superior performance. Ask the plant operators who are using AMERICANS and they will tell you how their crushing costs have been reduced and how their product has been improved.

You, too, can have these benefits by installing an AMERICAN. Let us show you complete details.

Send us your inquiries.

American Pulverizer Co. 1245 Macklind Avenue ST. LOUIS, MO.



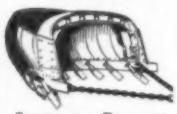
Above is simple set-up of Sauerman Scraper for open storage.

DIG, HAUL & DUMP . . .

for a few cents per cubic yard

Whether your problem is to dig gravel from a pit, bank or river, or to convey rock from quarry to crusher, or to stockpile and reclaim your surplus products—there is a size and type of Sauerman machine to meet your needs most economically. Put your problem up to us and we will save you money.

Sauerman Slackline Cableway Bucket



Sauerman Crescent Scraper Bucket

SAUERMAN BROS., INC.
430 S. Clinton St. Chicago

Write for Catalog

SAUERMAN
LONG RANGE MACHINES

A NEW *Free* SERVICE

See Pages 81-82

A quick, easy, time-saving method of keeping in touch with the latest developments in machinery and equipment.

Just check the items you want to know more about and mail the self-addressed reply card.

If you do not find a catalog of some particular piece of equipment address your inquiry to our Service Department. We will be happy to answer any questions pertaining to machinery, equipment or supplies.

ROCK PRODUCTS

205 West Wacker Drive Chicago, Illinois

Classified Directory (Cont.)

Pallets (Steel & Wood)
Anchor Concrete Machy. Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Commercial Shearing & Stamping Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Pans, Grinding (Wet & Dry)
Eagle Iron Wks.
Jackson & Church Co.
McLanahan & Stone Corp.
Traylor Engr. & Mfg. Co.

Perforated Metal
Bacon, Earle C., Inc.
Chicago Perforating Co.
Harrington & King Perf. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Son, Inc.
Traylor Engr. & Mfg. Co.

Pinions
Bacon, Earle C., Inc.
Frog, Switch & Mfg. Co., The
General Electric Co.
Jeffrey Mfg. Co., The
Link-Belt Co.

Pipe
Bethlehem Steel Co.
Chicago Bridge & Iron Co.
Frog, Switch & Mfg. Co., The
Hetherington & Berner, Inc.

Pipe Fittings
Hetherington & Berner, Inc.

Pipe, Forms & Machine (Concrete)
Besser Mfg. Co.
Stearns Mfg. Co.
Universal Concrete Pipe Co.

Plaster Mixers
Eagle Iron Works
Jaeger Machine Co.

Plaster Plants
Koehring Co.

Poidometers
Schaffer Poidometer Co.

Pontoons
Chicago Bridge & Iron Co.
Eagle Iron Wks.

Powder (Blasting)
Atlas Powder Co.

Power Transmission Machinery
Jeffrey Mfg. Co., The
Link-Belt Company
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Power Units
Caterpillar Tractor Co.
Cummins Engine Co. (Diesel)
Nordberg Mfg. Co.

Precipitators (Cottrell)
Research Corp.
Western Precipitation Co.

Pulleys
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.

Pulverizer Parts
American Pulv. Co.
Dixie Machinery Mfg. Co.
Frog, Switch & Mfg. Co.
Hardinge Co.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.

Pulverizers (Hammer, Ring, Rod & Roll) (See also Mills & Crushers)
American Pulverizer Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Blaw-Knox Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Combustion Engr. Corp.
Dixie Machy. Corp.
Hardinge Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Pumps (Diaphragm)
Hardinge Co.
Jaeger Machine Co.

Pump Valves (Dry Pulverized Material)
Fuller Co.

Pumps (Dredge)
Bucyrus-Erie Co.
Hetherington & Berner

Pumps (Dry Pulverized Material)
Babcock & Wilcox Co.
Fuller Co., The
Smidth, F. L., & Co.

Pumps (Slurry)
Hardinge Co.
Smidth, F. L., & Co.
Wilfley, A. R., & Sons, Inc.

Pump, Slurry, Valves
Fuller Co., The
Wilfley, A. R., & Sons, Inc.

Pumps (Vacuum)
Fuller Co., The
Gardner-Denver Co.
Smidth, F. L., & Co.

Pumps (Water)
Gardner-Denver Co.
Jaeger Machine Co.

Rails
Bethlehem Steel Co.

Railway Equipment
General Electric Co.

Railways (Electric)
General Electric Co

Rectifiers
General Electric Co.

Recuperators
Traylor Engr. & Mfg. Co.

Refractories
Babcock & Wilcox Co.
Smidth, F. L., & Co.

Regulators (Voltage)
General Electric Co.

Rewashers (Screw)
Eagle Iron Works
Link-Belt Co.
Smith Engr. Wks.

Rheostats
Atlas Powder Co.
General Electric Co.

Roofing
Bethlehem Steel Co.
Ryerson, Jos. T., & Son, Inc.
Texas Co., The

Sand Drags
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Smith Engr. Wks.

Sand and Gravel Plants
Austin-Western Road Machy. Co., The
Bacon, Earle C., Inc.
Eagle Iron Wks.
Hardinge Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Sand Lime Brick Machinery
Hardinge Co.
Jackson & Church Co.
Jeffrey Mfg. Co.

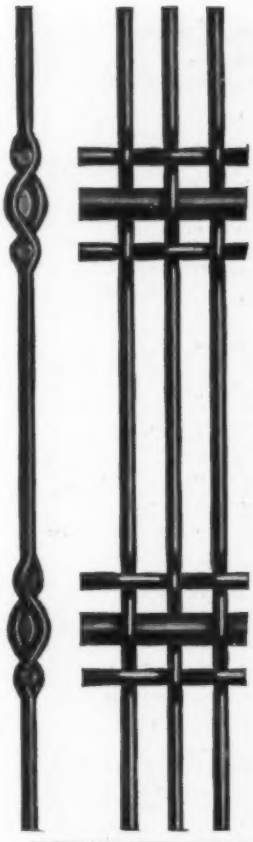
Sand Separators
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks., Inc.
Simplicity Engineering Co.
Smith Engineering Wks.

Sand Settling Tanks
Chicago Bridge & Iron Co.
Eagle Iron Wks.
Jeffrey Mfg. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Pioneer Engr. Wks.
Smith Engr. Wks.

Scales (Conveyor)
Merrick Scale Mfg. Co.

Scales (Hopper)
Blaw-Knox Co.
Merrick Scale Mfg. Co.

Scales (Truck and Track)
Hardinge Co.



STA-TRU
Long-Mesh
Woven Wire Screens

made to work under tension and vibration.
The straight stay-bars carry ALL the tension. The crimps in the round wires can not be stretched or broken. The screen can not be caused to sag or split by the pull of the tensioning device.

LUDLOW-SAYLOR
WIRE CO. ST. LOUIS

Only Jaeger Truck Mixers Give You These Features . . .

- DUAL-MIX ACTION produces higher strength concrete—as proved by the Hollister Tests !
- THROW-BACK BLADES — essential to fast, thoro mix. Only Jaeger has them !
- DUAL-REVOLVING WATER SPRAYS — fastest water distribution; sprays to both ends of drum !
- SYPHO-METER TANK — insures accurate water control !
- VACUUM CAB CONTROL of shock-proof, 2-speed transmission — choice of truck engine or separate engine drive !
- COR-TEN STEEL — lighter, stronger, resists both rust and abrasion !

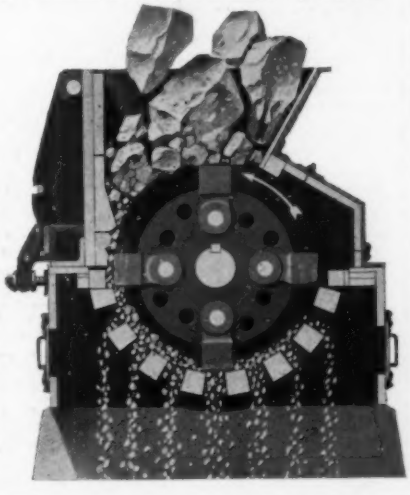
Send for new catalog showing why Jaeger Truck Mixers far outsell all others.

THE JAEGER MACHINE CO.
603 DUBLIN AVE., COLUMBUS, OHIO

HEAVY DUTY CRUSHERS Reduce in ONE OPERATION

Jeffrey Heavy Duty Hammer Crushers reduce steam shovel size limestone shale in ONE OPERATION to 1½" and under suitable for storage and for blending as feed to raw grinding mills as in Cement Mill operations. One Jeffrey Crusher will do the work of several primary crushers of other makes. Write for literature.

REDUCTION DIVISION
THE JEFFREY MANUFACTURING COMPANY
935-99 North Fourth Street, Columbus, Ohio



All parts on Jeffrey Heavy Duty Hammer Crushers are extra heavy and rugged to withstand severe and continuous service. Equipped with oversize slugger hammers and furnished with either heavy cast iron or Armorplate steel frames with manganese steel liners.

Screening for Profit

WITH LINK-BELT VIBRATING SCREENS

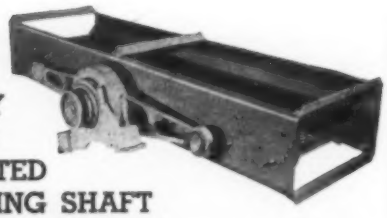
● Hundreds of Link-Belt vibrating screen installations are proving their efficiency in screening for profit — handling a large variety of materials, such as sand, stone, gravel, coal, fertilizer, ores, grain, oil well drilling mud, chemicals, removing solids from factory wastewater, etc. Send for Book No. 1562.

Return Coupon for This Book

LINK-BELT COMPANY, 2045 W. Hunting Park Ave., Philadelphia, or nearest office. 7670-A

☐ Send Vibrating Screen Book No. 1562
☐ We are interested in a screen for _____

Name _____
Address _____
City _____ State _____



1. COMPLETELY ADJUSTABLE
2. OIL LUBRICATED
3. FULL FLOATING SHAFT
4. STURDY CONSTRUCTION

• *Write for "DATA BOOK"*

PRODUCTIVE EQUIPMENT CORP.

4600 SOUTH KEDZIE AVENUE CHICAGO, U.S.A.

Why ship dirty stone when it can be made clean easily and so economically?

SCRUBBER

This scrubber will do the good work.

State Capacity Required!

LEWISTOWN FOUNDRY & MACHINE CO.

Mfrs. of Sand Crushing, Grinding, Washing and Drying Machinery

LEWISTOWN - - - - - PENN.

IT'S OUT—BOOK III

The Pneumonokonioses (Silicosis)

A World Review of Silicosis and Allied Diseases

BY DAVIS, SALMONSEN AND EARLYWINE

700 Reviews—1066 Pages—Indexed.

1935-1936 and Current Literature and Laws.

BOOK III **$8.50**

BOOKS I, II and III **$20.00**

Medicine—Law—Engineering—in the United States and Foreign Lands

SEND CHECK WITH ORDER

ROCK PRODUCTS

205 W. Wacker Drive Chicago, Ill.

109 Outstanding Welding Studies

from the $200,000 AWARD PROGRAM

at The James F. Lincoln Arc Welding Foundation

Made available in book form by Trustees of the Lincoln Foundation, who regard the award papers a large and valuable source of scientific study, research and information on Welding engineering and practice.

"ARC WELDING IN DESIGN, MANUFACTURE AND CONSTRUCTION"

A volume of data unique in technical literature. Written by acknowledged leaders—executives, engineers, designers, architects and production officials.

A wide variety of subjects representing every division of industry. Each study is a complete treatise.

Papers arranged in 10 sections: (1) Automotive; (2) Aircraft; (3) Railroad; (4) Watercraft; (5) Structural; (6) Furniture and Fixtures; (7) Commercial Welding . . . Automotive Repair . . . Welderies; (8) Containers; (9) Machinery; (10) Jigs and Fixtures.

Invaluable for a complete working knowledge of modern manufacturing and construction with welding.

1408 Pages
695 Illustrations

Size: 6x9 inches; printed on fine paper

Price: $1.50 postpaid anywhere in U. S. A. $2.00 elsewhere.

Send check or money order to:

TRADEPRESS PUBLISHING CORP.

205 WEST WACKER DRIVE • CHICAGO, ILL.

Classified Directory (Cont.)

Scrapers (Power Drag)
Austin-Western Rd. Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Hayward Co., The
Jeffrey Mfg. Co.
Link-Belt Co.
Northwest Engineering Co.
Pioneer Engr. Wks.
Sauerman Bros.

Scrapers (Wagon)
Bucyrus-Erie Co.

Screen Cloth & Plates (Perforated)
Bacon, Earle C., Inc.
Chicago Perforating Co.
Harrington & King Perforating Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.

Screen Parts
Bacon, Earle C., Inc.
Hardinge Co.
Pioneer Engr. Wks.
Screen Equipment Co.
Traylor Engr. & Mfg. Co.

Screens
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Eagle Iron Works
Hardinge Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Simplicity Engineering Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., & Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens (Grizzly)
Austin-Western Rd. Machy. Co.
Eagle Iron Wks.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Pioneer Engr. Wks. Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Ross Screen & Feeder Co.
Screen Equipment Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.

Screens (Laboratory)
Hardinge Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Roebling's, John A., Sons, Co.
Smidth, F. L., & Co.
Tyler, W. S., Co.
Williams Patent Crusher & Pulv. Co.

Screens (Revolving)
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Eagle Iron Wks.
Hardinge Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt
Roebling's, John A., Sons Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.

Screens (Rotary)
Link-Belt Co.
Smith Engr. Wks.

Screens (Scalping)
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Screen Equipment Co.
Smith Engr. Wks.
Williams Patent Crusher & Pulv. Co.

Screens (Trommel)
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Screens (Vibrating)
Austin-Western Road Machinery Co.
Bacon, Earle C., Inc.
Eagle Iron Wks.
Hardinge Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Roebling's John A., Sons Co.
Screen Equipment Co.
Simplicity Engineering Co.
Smith Engr. Wks.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens (Washing)
Link-Belt Co.
McLanahan & Stone Corp.
Screen Equipment Co.

Scrubbers (Washers)
Link-Belt Co.
McLanahan & Stone Corp.
Smith Engr. Wks.
Tyler, W. S., Co.

Seal Rings
Traylor Engr. & Mfg. Co.

Septic Tank Molds (Concrete)
Suburban Sanitation Systems Co.

Shafting
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Shale Planers
Eagle Iron Works

Sheaves
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Eagle Iron Wks.
Hetherington & Berner
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Roebling's, John A., Sons Co.
Sauerman Bros.

Shovels (Compressed Air)
Nordberg Mfg. Co.

Shovels, Power (Diesel, Diesel-Air Electric, Gasoline, Gas-Electric, Oil, Steam)
Austin-Western Rd. Machinery Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.
Marion Steam Shovel Co.
Northwest Engineering Co.
Thew Shovel Co.

Shovel Repair Parts (Manganese)
Harnischfeger Corp.

Shovels (Tractor)
Austin-Western Rd. Machy. Co.
Harnischfeger Corp.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.

Shovels (Truck)
Link-Belt Speeder Corp.
Thew Shovel Co.

Shovels (Underground)
Harnischfeger Corp.
Lima Loco. Wks., Inc. (Shovel & Crane Div.)
Nordberg Mfg. Co.
Thew Shovel Co.

PRODUCE HIGH EARLY STRENGTH

Normal, general-purpose, masonry, plastering and stuccoing cements under the several BLANK patented processes.

•

Inquiries invited from producers of cement, lime and allied products.

Patents issued and pending in the United States, Canada, and in leading Central and South American and European Countries.

Investigations and experimental tests carried out at plants of interested producers by technical experts familiar with processes at no cost to producer.

Our booklet No. 1 will be sent interested parties on request.

CEMENT PROCESS CORP.

John A. Blank, Chemical Engr.,
Cement & Lime Plants Division,
710 So. 6th St., Ironton, Ohio

MAIN OFFICE
90 Broad Street
New York

MEXICAN BRANCH
P.O. Box 515, Mexico City, Mexico

Keep your conveyor belts going with FLEXCO HD BELT FASTENERS

• **FLEXCO H D RIP PLATES** are used in repairing rips and patching conveyor belts. The wide space between outer bolts gives the fastener a long grip on the edges of the rip, while the center bolt prevents the fasteners from bulging.

• Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco HD belt fasteners and rip plates. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.

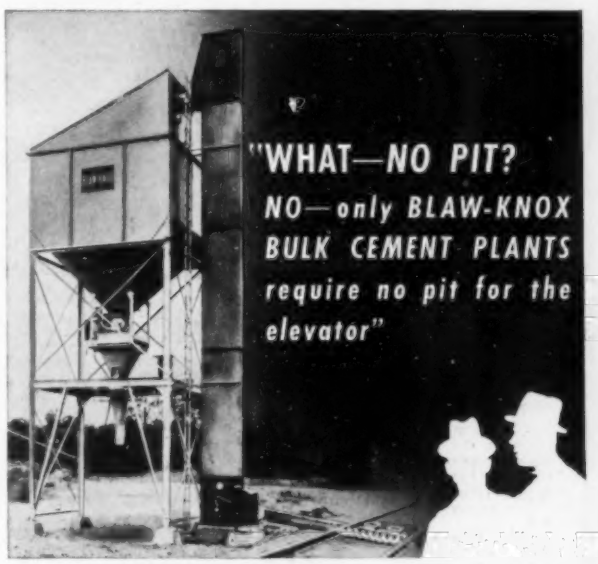
• **FLEXCO H D BELT FASTENERS** make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Five sizes in steel and alloys.

Folder WRP shows exactly how to make tight butt joints in conveyor belts with Flexco HD Belt Fasteners. Also illustrates step by step the latest practice in repairing rips and putting in patches.

FLEXIBLE STEEL LACING COMPANY
4684 Lexington St., Chicago

Write for your copy

FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere



"WHAT—NO PIT?

NO—only BLAW-KNOX BULK CEMENT PLANTS require no pit for the elevator"

Blaw-Knox BULK CEMENT PLANTS are the ultimate in portability, speed, and convenience of use and operation. They are *complete units* for unloading, storage, batching and handling of bulk cement—dependable and accurate.

Completely described in Blaw-Knox Catalog No. 1566. Send for copy.

21

BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

Bulk Cement Plants

FAST WATER!

"MAN... That new WATER IMPELLER in BLAW-KNOX TRUKMIXERS puts water into the batch in one-third the time formerly required."

The new, fast water impeller that won't clog; an accurate and dependable water measuring system; superb mixing action—and assurance of dependable continuous operation make Blaw-Knox Trukmixers the popular choice, and the practical buy for you. Study these features before you decide.

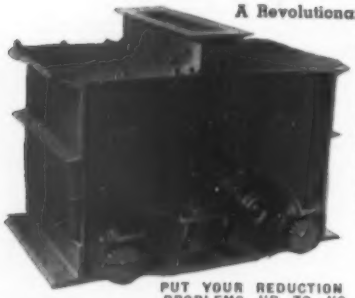
Send for BLAW-KNOX Catalog 1582

BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

***Agitators and* TRUKMIXERS**

"PENNSYLVANIA" REVERSIBLE HAMMERMILL

A Revolutionary Development because:—



Major Reduction by smashing impact,—
Daily reversal automatically turns and resharpens Hammers and Cage Bars,—
Increased capacity and fineness,—
Lower Power demand per ton,—
Upkeep cost sharply cut,—
Twenty (20) sizes specialized for the varied needs of the Rock Products Industries.

PENNSYLVANIA CRUSHER COMPANY

PUT YOUR REDUCTION PROBLEMS UP TO US

Liberty Trust Bldg.
PHILADELPHIA, PA.

STEELGRIP

FOR HEAVY "OUTDOOR" DRIVES

As manufacturers of **both** types of flexible belt lacing, we recommend STEELGRIP for heavy drives, conveyor belts and outdoor jobs for: (1st) It can be applied anywhere—all you need is a hammer. (2nd) It compresses and protects belt ends—prevents fraying, adds to belt life. It is flexible and easily detachable. (3rd) It stands corrosion and erosion better than the lighter belt hooks.

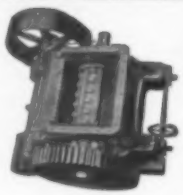
STEELGRIP comes in 8 sizes, in handy boxes or long lengths, with 2-piece hinged locker pins that add flexibility and take the wear. It penetrates the toughest belt easily, clinches securely. Makes a permanent "humpless" joint. **Write for catalog sheets and name of local distributor.**

ARMSTRONG-BRAY & CO.
325 N. Loomis St., Chicago, U.S.A.

SAND and GRAVEL PUMPS

10" DREADNOUGHT

HETHERINGTON & BERNER INC.
701 745 KENTUCKY AVENUE • • • • INDIANAPOLIS, INDIANA



McLANAHAN EQUIPMENT

CRUSHERS

Single and double roll and jaw crushers, hammer mills, super dry pans—steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists.

SCREENS

Complete portable, semi-portable and stationary crushing, screening, and washing plants for different capacities of any materials.

McLanahan & Stone Corp.

Established 1835
HOLLIDAYSBURG, PENNSYLVANIA

Classified Directory (Cont.)

Shredders
Williams Patent Crusher & Pulv. Co.

Sieves (Testing)
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Tyler, W. S.

Silos (Storage)
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Marietta Concrete Corp.
Smidth, F. L., & Co.

Silo Stave Machines (Concrete)
Besser Mfg. Co.

Skids
Besser Mfg. Co.
Chase Foundry & Mfg. Co.

Slakers (Rotary)
Traylor Engr. & Mfg. Co.

Slugs (Grinding)
Smidth, F. L., & Co.

Slurry Mixers
Hardinge Co.
Smidth, F. L., & Co.

Slurry Separators
Smidth, F. L., & Co.

Slurry Thickeners
Hardinge Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Smokestacks
Chicago Bridge & Iron Co.
Northern Blower Co.
Traylor Engr. & Mfg. Co.

Speed Reducers (Gear, etc.)
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Spouts
Jeffrey Mfg. Co.
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Sprays & Spraying Equipment
Link-Belt Co.

Sprockets
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.

Stabilization Equipment
Barber-Greene Co.
Besser Mfg. Co.
Pioneer Engr. Wks.

Standpipes
Chicago Bridge & Iron Co.
Ross Screen & Feeder Co.

Steel (Abrasive-Resisting)
Ryerson, Jos. T., & Son, Inc.

Steel (Special Alloy)
Chicago Steel Foundry Co.

Stokers
Babcock & Wilcox Co.
Combustion Engr. Co., Inc.
Link-Belt Co.

Storage Equipment
Barber-Greene Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Jeffrey Mfg. Co.
Kern, Fred T., Co.
Link-Belt Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Strippers (Concrete)
Anchor Concrete Machinery Co.
Multiplex Concrete Machinery Co.

Switchboards
General Electric Co.

Tachometers
General Electric Co.

Tampers (Power & Hand)
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Kent Machine Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Tanks (Air, Storage, etc.)
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Combustion Engr. Co.
Eagle Iron Wks.
Hardinge Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Pioneer Engr. Wks.
Raymond Pulv. Div.
Traylor Engr. & Mfg. Co.

Towers
Blaw-Knox Co.
Eagle Iron Works
Jaeger Machine Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Track and Track Equipment
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Nordberg Mfg. Co.

Track Shifters
Nordberg Mfg. Co.

Track Systems (Overhead)
Jeffrey Mfg. Co.
Link-Belt Co.

Tractors
Caterpillar Tractor Co.
Koehring Co.

Tractors (Electric)
Link-Belt Co.

Trailers (Industrial, Quarry)
Athey Truss Wheel Co.
Austin-Western Rd. Machinery Co.
Koehring Co.
Link-Belt Speeder Corp.

Transformers
General Electric Co.

Trench Hoes
Link-Belt Speeder Corp.

Trucks (Agitator)
Blaw-Knox Co.
Jaeger Machine Co.
Smidth, F. L., & Co .

Truck Bodies (Dump)
Athey Truss Wheel Co.
Commercial Shearing & Stamping Co.
Dempster Bros.

Trucks (Dump)
Chase Foundry & Mfg. Co.

Trucks (Hand)
Chase Foundry & Mfg. Co.

Trucks (Industrial)
Chase Foundry & Mfg. Co.

Trucks (Mixer)
Blaw-Knox Co.
Jaeger Machine Co.
Smidth, F. L., & Co.

Turbines
General Electric Co.

Unloaders (Car, Bin, Truck, etc.)
Barber-Greene Co.
Bucyrus-Erie Co.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Robins Conveying Belt Co.

Unloaders (Boat)
Link-Belt Co.

Unloaders (Box Car)
Barber-Greene Co.
Besser Mfg. Co.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Stearns Mfg. Co.

Unloaders (Pneumatic)
Fuller Co.

Unloaders (Underground)
Jeffrey Mfg. Co.
Nordberg Mfg. Co.

Ventilating Apparatus
Blaw-Knox Co.
Northern Blower Co.

Vibrators (Bin and Concrete Form)
Besser Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Stearns Mfg. Co.
Tyler, W. S., Co.

Vibrating Screens
Austin-Western Rd. Machinery Co., The
Bacon, Earle C., Inc.
Eagle Iron Works
Hardinge Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Co.
Nordberg Mfg. Co.

Classified Directory (Cont.)

Pioneer Engineering Wks.
Robins Conveying Belt Co.
Screen Equipment Co.
Simplicity Engineering Co.
Smith Engr. Wks.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Wagons (Dump)
Athey Truss Wheel Co.
Austin-Western Rd. Machy. Co.
Blaw-Knox Co.
Koehring Co.

Washers (Log)
Eagle Iron Works
Hardinge Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks., Inc.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.

Washers (Sand, Gravel & Stone)
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Chicago Bridge & Iron Co.
Hardinge Co.
Jeffrey Mfg. Co.
Lewiston Fdry. & Machy. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.

Weighing Equipment
Blaw-Knox Co.
Fuller Co.
Hardinge Co.
Jaeger Machine Co.
Merrick Scale Mfg. Co.
Schaffer Poidometer Co.

Welding and Cutting Equipment
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
General Electric Co.
Harnischfeger Corp.
Roebling's, John A., Sons Co.

Welding Electrodes
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Harnischfeger Corp.

Welding Rods
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Roebling's, John A., Sons Co.
Ryerson, Jos. T., & Son, Inc.

Welding Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hazard Wire Rope Div.
Roebling's, John A., Sons Co.

Wheel or Gear Pullers
Armstrong-Bray & Co.

Wheels (Tracklaying Type)
Athey Truss Wheel Co.

Winches
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Wire Cloth
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bacon, Earle C., Inc.
Cleveland Wire Cloth & Mfg. Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Eagle Iron Works
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
Pioneer Eng. Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Screen Equipment Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.

Wire (Copper, Iron & Steel)
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
General Electric Co.
Roebling's, John A., Sons Co.

Wire (Electric)
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
General Electric Co.
Roebling's, John A., Sons Co.

Wire Rope
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hazard Wire Rope Co.
Leschen A., & Sons, Rope Co.
Roebling's, John A., Sons Co.

Wire Rope Clips
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hazard Wire Rope Co.
Leschen A., & Sons
Laughlin, Thomas, Inc.
Roebling's, John A., Sons Co.

Wire Rope Coatings
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)

Wire Rope Fittings
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hazard Wire Rope Co.
Leschen A. & Sons, Rope Co.
Laughlin, Thomas, Inc.
Roebling's, John A., Sons Co.

Wire Rope Hooks
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hazard Wire Rope Co.
Laughlin, Thomas, Inc.
Leschen A., & Sons, Rope Co.
Roebling's, John A., Sons Co.

Wire Rope Lubricants
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Roebling's, John A., Sons Co.
Texas Co., The

Wire Rope Slings
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hazard Wire Rope Co.
Leschen, A., & Sons, Rope Co.
Roebling's, John A., Sons

Wire Rope Sockets
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hazard Wire Rope Co.
Laughlin, Thomas, Inc.
Leschen, A., & Sons Rope Co.
Roeblings, John A., Sons Co.

Wire Rope Thimbles
Laughlin, Thomas, Inc.

Wire Turnbuckles
Laughlin, Thomas, Inc.

RYERSON CERTIFIED STEELS

UNIFORM HIGH QUALITY STEELS
...at No Extra Cost
IMMEDIATE STOCK SHIPMENT

Ryerson Certified Steels represent the highest quality obtainable in each class and type of material. Special abrasion resisting steels, perforated metals and other products for the Rock Products Industry are included in the large and complete Ryerson stocks. When you need steel get in touch with the plant nearest you. Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON Certified STEELS

HAYWARD BUCKETS

USE RIGHT BUCKET FOR THE JOB
Hayward makes all four—clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.
THE HAYWARD COMPANY
203-204 Fulton Street
New York, N. Y.

WILFLEY
centrifugal SAND PUMPS
for Slurries, Sand Tailings, Slimes, Acid Sludges

Save Pumping Costs
Continuous operation without attention for long periods. Stuffing box, stuffing, gland water ALL eliminated. Close clearances maintained by easy slippage seal adjustment. Heavy pumping parts of material best suited for YOUR particular problem. Complete engineering service. Prompt shipment of parts. The most efficient and economical pump you can buy. *Write for Complete Catalog*
A. R. WILFLEY & SONS, Inc., Denver, Colo., U. S. A.
NEW YORK OFFICE: 1775 BROADWAY

PERFORATED METAL
SAND AND GRAVEL SCREENS
Manufactured exactly to your specifications
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices
CHICAGO PERFORATING CO.
2437 West 24th Place
CHICAGO, ILLINOIS
Canal 1459

Classified Advertisements

Consolidated Offers

LOCOMOTIVE

16-ton Whitcomb Gasoline Locomotive, standard gauge, 6-cylinder, 6x7 motor, self-starter. 90% new. Running demonstration.

SHOVELS AND CRANES

1—Bucyrus Erie 10-B Shovel, ⅜ yard.
1—Byers ½ yard gasoline Shovel.
1—Lorain 75-B gasoline Shovel, 1½ yd.
1—Lorain 77 Diesel Shovel.
1—Lorain 77 Diesel Crane.
1—50-B Bucyrus Erie Dragline, 60′ boom, Atlas Imperial Engine.
1—30-B Bucyrus Erie Dragline, Atlas Imperial Engine.
1—Monighan 3-T. Diesel Driven 3 yard Walking Dragline.

JAW CRUSHERS

42"x48" Traylor; 15x30, 18x36, 24x36, 30x42" Farrel; 24"x36", 36x48 Allis-Chalmers; 30x42 Buchanan.

FINISHING GYRATORY CRUSHERS

2′ and 3′ Symons; 3′ Traylor; 4′ Traylor No. 4 10-TZ; 5′ Newhouse with 40 H.P. motor; Nos. 19, 25, 37, 49 Kennedy.

PULVERIZERS

1—4 roll Raymond High Side Mills, also 3-roll.
3—5 and 6-roll Raymond Low Side Mills.
8—Raymond beater types, Nos. 0000, 00, 1, 3 and Nos. 32, 55, 60 and 90 Imp. Mills.
4—Sturtevant Ring Roll Mills, Nos. 0, 1, 2.
Coal Pulverizers—Raymond, Aero, Erie City, Simplex, Kennedy.
Kent Maxecon and Bradley Mills.

AIR CLASSIFIERS

2—10′ Sturtevant "Whirlwind".
3—10′, 12′, 14′ Gayco.
1—30″ Raymond.

VIBRATING SCREENS

3—5′x10′ Symons Screens, 2-deck, each with 7½ H.P. 3/60/440 volt motor.
3—4′x7′ Jeffrey-Traylor FH-4, magnetic, all 2-deck. Used 30 days. With motor generator sets, panels, etc.
1—4′x8′ Robins Gyrex, 2-deck.
2—3′x6′ Sturtevant Moto-Vibro, 2-deck.
8—Tyler Hummers, 3′x5′, 4x5, 4x7, 1 to 3 decks.

BINS AND TANKS

6—10x30 Vertical Steel Tanks, 125 tons or 18,000 gallons, at Peekskill, N. Y.
1—Blaw Knox 300 bbl. Cement Bin, electric scales, generator sets. Complete.

ROTARY DRYERS

9—3′x20, 4x30, 5x30, 6x40, 6x60, 8x60, 8′8″x85′.
2—5x30′, 70″x35′ Ruggles-Coles, double shell.
1—5x35′ Indirect Heat, double shell.

ROTARY KILNS

3—6′x40′ Bonnot, each complete with firing hood, spring seals and with or without rotary coolers; also 4′x30′ Ruggles-Coles; 5x50′ Vulcan; 5′4x33′ Fuller; 6x60′ Reeves; 7x100′ Vulcan; 8x110′ Reeves.

BALL, ROD AND TUBE MILLS

2—6′x12′ Hardinge Rod Mills—direct drive.
2—6′x12′ Allis-Chalmers Rod Mills, inc. motors.
1—3′x12′ Hendy Tube Mill.
1—5′x36′ Vulcan, 3-comp. iron lined, used 3 days.
6—Hardinge Conical Mills—4′6″x16″, 5′x22″, 6′x22″, 8′x30″.
1—6′x8′ Patterson cont. Mill with air separator.
8—Pebble Mills: 4′6″x3′6″, 5x4, 6x8, 7′6x5′ and other sizes.
4—5′x22′, 6x22, Tube Mills—iron and silex lined.
1—5′x10′ Marcy Rod Mill.

AIR COMPRESSORS

2—POC-2 I.R., 550 CFM., Diesel driven.
1—PRE-2 I.R., 1300 CFM., syn. motor.
2—WN-31 Sullivan, 1573 CFM., syn motors.

Write for detailed illustrated circulars.

CONSOLIDATED PRODUCTS CO., INC.
15-16-17 PARK ROW — NEW YORK, N. Y.

Our shops at Newark, N. J., cover eight acres.

CONCRETE—CEMENT—EQUIPMENT

Butler batching plant, 5 compts., cap. 105 yds. aggregate, 200 bbl. cement, weighing devices, elevator, conveyors, complete.
225 bbl. Erie bulk cement plant, complete.
155 bbl. Fuller cement bin, electric batcher.
4 Blaw Knox circular bins, 60 tons each.
2 Smith 1 yd. tilting mixers, electric. Complete.

CRUSHERS—PULVERIZERS—SCREENS—FEEDERS

Jaw: 6x12, 9x16, 10x29, 12x26, 13x30, 16x36, 24x36.
Gyratory: K.V.S. 19, 25-S, 30, 37-S, 49; Telsmith 8A; Traylor 8″.
Superior McCully 13″, 8″, 6″.
Jeffrey Type A 30″ x 24″ pulverizer.
Jeffrey 24″ x 24″ spiked roll crusher.
Robbins apron feeders, 18″ x 6′, 24″ x 6′.
Traylor apron feeder, 5′ x 15′.
Bucket elevator, 32′ chain, buckets 8″x6″x12″.
3′ x 6′ K. V. S. single deck, vibrating.
3′ x 6′ 3 decks, vibrating.
3′ x 6′ Telsmith, 2 deck, vibrating screen.
48″ x 20′ Allis Chalmers revolving scalping screens, full manganese.
Robbins 4x8 double deck Gyrex vib. screen.

CRANES—SHOVELS—DRAGLINES

Whirley, 25 tons cap., 85′ boom, electric.
43-B Bucyrus Erie Diesel 2 yd. shovel.
41-B Bucyrus Erie comb. crane and shovel. Steam.
P & H Model 650 crane, 60′ boom.
Northwest No. 4 crane and backhoe.
Lorain Model 40 truck crane.
Lima Model 101 crane, 1¼ yd.
Ohio 25 ton locomotive steam crane, 60′ boom.

BUCKETS

Williams Hercules 1½ yd. digging clamshell NEW.
Hayward clamshell 1½ yd. rehandling.
Owen ½ yd. Type M digging clamshell.
Sauerman Crescent drag scraper, ¾ yd.
Blaw-Knox 1 cu. yd. dragline bucket.

CONVEYING EQUIPMENT

Barber Greene conveyor, 24″ x 200′, complete.
8 Barber Greene conveyors, 24″ x 35′, type N.
New conveyor belt, special stock, 14″ to 48″.
Head & tail pulleys, take-ups, rollers, idlers.

MISCELLANEOUS

120 HP gas engine, clutch, tex rope pulley.
4 I. R. wagon drills, Model FM-2, pneumatic tires.
I. R. Model 50 Leyner drill sharpener.
I. R. Model JE electric bit grinder.
Gas locomotives, 2½ to 35 tons.
Dredge pumps, 6″, 8″, 10″, 12″, 16″.

RICHARD P. WALSH
30 CHURCH STREET, NEW YORK, N. Y.

No. 19, 25S, 49 Kennedy, TZ Traylor, 8A Telsmith Gyratory Crushers.
15x36″, 24x36″ Farrell, 24x72″ Traylor Jaw Crushers.
30x39″, 40x15″, 54x24″ Crushing Rolls.
16, 18, 19 and 21 ton ST Locomotives.
1 yd. Koppel, 4 yd. Western 36″ ga. Dump cars.
2 T and 3 W Monighan Walker, Bucyrus Erie 3 & 5 yd. Diesel-Electric Draglines.
90 HP Fairbanks Model 34B Diesel Engine.
Vibrating Screens, all makes and sizes.
Shovels, Cranes, Compressors, Conveyors, etc.
Anything and Everything for Quarry Operation.
Let us have your inquiries. Ask for Bulletin 47.

MID-CONTINENT EQUIPMENT CO.
710 EASTGATE — Pa 2290 — ST. LOUIS, MO.

CRUSHERS

GYRATORY: 42″ McCully with 80% brand new parts. 36″ Allis-C. 20″ Super. McCully conv. to 16″. Gates Nos. 10, 9, 8, 7½, 6, 5, 4, 3, 2, 1 (75 avail.) Telsmith Nos. 4, 5, 6, 8C, 9 & 16. Also Many Austins, Kennedys and Traylors, many sizes.
JAW TYPE: Traylor 60x84, 48x60, 42x48, 24x72. Superior 84x66 & 24x36. Buchanan 30x42. Farrel 60x42, 30x36, 24x36, 18x36, 12x24. Good Roads 1030. Acme 24x40. Misc. 7x12, 9x16, 8x20, 8x24, 12x24, 9x36, 9x30, 15x36.
REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Traylor 36″ TZ, 8″, 10″, 12″ Super. McCully 6″ & 10″. Newhouse 5, 7 & 10″. Symons Cone & Disc Ty. 2′ to 4′.
ROLLS: Allis-C. 12½x12, 36x16, 40x15, 54x24 & 72x30. Fairmount 36x60 & Jeffrey 24x24 to 36x54 single roll. Cornish 36x14 & 42x16, Etc., Etc.
HAMMERMILLS: Williams No. 1, 2, 3, 4, 8 & 9. Jeffrey 36x18 & 36x42. Day Nos. 20 & 40, Etc.
MILLS: Kennedy Ball 4x6, 5x6 & 5x8. Marcy 8x6 & 10x9. Hardinge 6′x3′, 8′x30″ & 6′x9′. Misc. Tube Mills 5′ & 6′ x 22′. Sturtevant Ring Roll, Raymonds, Kents, Fuller-Lehigh, Etc., Etc.
CRUSHING PLANTS: No. 65 Diamond. No. 22 Pioneer 8x24. 1030 Good Roads, 9x40 Austin-Western, 9x36 C.R.

MISCELLANEOUS ITEMS

Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryers, Derricks, Draglines, Drag Scrapers, Dredges, Drills, Engines, Elevators, Excavators, Generators, Hoists, Kilns, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Shacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. **(I have equipment at many points in the United States and Canada. What you need may be near your plant.)**

ALEXANDER T. McLEOD
7229 Rogers Avenue — CHICAGO

New—RAILS—Relaying

ALL SECTIONS

Also contractors' equipment, "V" shaped and Western cars, 24 and 36-in. gauge, portable track, gas locos, frogs and switches. Attractive prices quoted. Wire, write or telephone for quotations.

M. K. FRANK
480 Lexington Ave., New York, N. Y. — 25 St. Nicholas Building, Pittsburgh, Pennsylvania

---

Truck Crane, ½ yard capacity, Orton gasoline operated.
Locomotive Crane-Orton, 7½ ton capacity. Equipped with a 50 ft. boom and gasoline operated. New 1934.
Gravel Plant—Consisting of portable gyratory crusher, bin with shaker screen and bucket elevator. Price $450.00.

P. A. HENAULT
2140 Book Bldg. — Detroit, Mich.

For Prompt Shipment Subject to Prior Sale

10 x 36 Gruendler Roller Bearing Crusher Plant with RA2P LeRoi Engine.
28′ Elevator.
36 x 12′ Screen.
30 Ton, 4 compartment Bin.
26′ Reject Conveyor. (Slightly used, as good as new)
NEW 15 x 36 Gruendler Roller Bearing Jaw Crusher.
NEW 24 x 36 Plain Bearing Jaw Crusher.
1—USED 10 to 15 ton per hour Gruendler Pulverizer.
1—NEW 10 to 15 ton per hour Pulverizer.
1—NEW 6 to 7 ton per hour Gruendler Pulverizer.

CRUSHER SERVICE
Box 795 — St. Louis, Missouri

USED SPEED REDUCERS

All Sizes - Types - Makes
Conveying Equipment
SAVE 60% OF NEW COSTS
All Materials Overhauled. Guaranteed
SEND FOR OUR STOCK LISTS

Patron Transmission Co.
154 GRAND ST. — NEW YORK

PIPE

Reconditioned pipe, new threads and couplings, all sizes, ¾ in. to 36 in., guaranteed suitable for all practical purposes.

MARINE METAL & SUPPLY CO.
167 South Street, New York City

"E. C. A. Rebuilt" Quarry and Gravel Plant Equipment

AIR COMPRESSORS

Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

BINS

1—150 ton 3 cpt. Blaw Knox; 1—118 ton Blaw Knox; 2—85 ton Heltzel; 1—72 Blaw Knox; 1—46 yd. Johnson offset; 1—60 ton Butler Y-40; 2—35 ton Blaw Knox; 1—30 ton Heltzel with Kron dial scale. All above with or without volume or weigh batchers.

2—Cement Plants: 1—1,200 bbl. Blaw Knox; 1—275 bbl. Johnson, portable.

BUCKETS

26—Clamshell, all sizes and types; Williams, Blaw Knox, and Owen.

6—Dragline: 1—1¾ yd. Northwest; 1—1½ yd. Omaha; 1—1¾ yd. Page; 2—1 yd. Hayward; 1—¾ yd. Page; 1—1½ yd. Pioneer Cableway Excavator bucket.

7—Dragscraper: 2—1 yd Sauerman; 1—1 yd. Green; 1—¾ yd. Garst; 2—½ yd. Garst.

CONVEYORS & ELEVATORS

4—18" Steel frame belt conveyors: 3—Barber-Greene, 60', 45' and 24'; 1—National 30'.

11—Bucket elevators: Rex and Weller, on chain or belt; all sizes.

CRANES, DRAGLINES & SHOVELS

1—Link Belt Mod. K-85 combination dragline and shovel Ser. No. 1698, gasoline power, 70' dragline boom, 2 yd. shovel front.

1—Page, Model No. 411 Diesel crawler dragline, 70' boom, 2 yd. bucket.

1—P & H Model No. 650, Serial No. 4188, 65' boom; 1¼ yd. bucket.

1—Link-Belt K-42, combination shovel, crane and trench hoe, Serial No. 1265, 1¼ yd. shovel front, 60' crane boom.

2—Northwest, Model 105, Serial No. 2953 & No. 1522 40' boom, 1 yd. bucket.

1—Link-Belt, K-1, Serial No. 1924, 50' boom, 1 yd. bucket.

2—Osgood Heavy Duty, Serial No. 2069 & No. 2087, combination 1 yd. shovel and crane, 40' boom.

2—Thew, Model "0" combination shovel crane and dragline, Serial No. 2801 & No. 2687, ¾ yd. shovel fronts, 40' crane boom.

1—P & H Model No. 206, 40' boom, ¾ yd. bucket.

1—Byers Bearcat, Serial No. 3290, 30' boom, ½ yd. bucket.

DREDGE PUMPS

1—12" Morris Heavy Duty D.C. to 100 H.P. dbl. cyl. steam engine.

4—Belt Driven: 3—Morris Mang., 1—10", 1—8", 1—6"; 1—Fairbanks-Morse Woods 6".

CRUSHERS

4—Jaw Crushers; 1—12x20" Champion; 1—10x20" Climax No. 2½; 1—9x16" Telsmith No. 9-A; 1—9x15 Champion.

3—Gyratory: 1 No. 5 Gates; 1 No. 3 McCully; 1 No. 0 McCully.

1—Set of Allis Chalmers, smooth type crushing rolls, 42x16".

TRACTORS AND SCRAPERS

4—13 yd. LeTourneau Type RY scrapers with Caterpillar D8 Diesel tractors, new 1938.

WHIRLEY

1—Mod. 75 Wiley Whirley No. 2973, 20 tons cap., 75' boom, 3D. Clyde 80 HP elec. hoist & 30 HP elec. swinger, all complete. Perfect condition.

SEND FOR NEW ORANGE PEEL STOCKLIST

EQUIPMENT CORPORATION OF AMERICA

PHILADELPHIA 1505 Race St. Phone Rittenhouse 4664 | CHICAGO 1119 S. Washtenaw Ave. Phone Nevada 2460 | PITTSBURGH P. O. Box 933 Phone Federal 2900

Complete

WOODFORD ELECTRIC ORE HAULAGE SYSTEM

Including ten 10-cu. yd. standard gauge side-dump cars, double-motored; all necessary electrical control equipment; Motor-Generator Set; rails, etc.

New York Trap Rock Corporation
230 Park Avenue
NEW YORK, N. Y.

FOR SALE

USED EQUIPMENT

9x18 DIAMOND Roller Bearing Jaw Crusher.
10x20 DIAMOND Roller Bearing Jaw Crusher.
10x36 DIAMOND Roller Bearing Jaw Crusher.
15x36 DIAMOND Roller Bearing Jaw Crusher.
2'0"x4'0" Single Deck DIAMOND Vibrating Screen.

NEW EQUIPMENT

1—DIAMOND 9x16 Bronze Bearing Jaw Crusher mounted on truck with 15-20 H.P. engine. Special price for quick sale.

Diamond Iron Works, Inc., and Mahr Manufacturing Company Div.
Minneapolis, Minn.

6½ yd. Shovel, Bucyrus, 320-B Electric
16—20 yd. Air Dump Cars, Magor, S.G.
4—20 yd. Air Dump Cars, Koppel, S.G.
36—5 yd. Hand Dump Cars, Western, 36" ga.
1—1000 G.P.M. Pump, 300' hd., 100 H.P., 3/60/2200
1—700 G.P.M. Pump, 200' hd., 50 H.P., 3/60/2200
1—10" AMSCO Manganese Pump
1—Compressor, 750 C.F.M., I-R Imperial 10, Steam
12—Hoist Motors, new, 50 H.P. & 25 H.P., 3/60/440
1—Tube Mill, 5' x 22' Allis Chalmers
1—25 ton Industrial Locomotive Crane, 50' boom
1—300 KVA Fairbanks Morse Diesel engine generator, 3/60/480
1—170 KVA Fairbanks Morse Diesel engine generator, 3/60/460
2—862 H.P. New Casey-Hedges Longitudinal Tube Boilers, never used.

Rails, Relaying; all sections. Cars, Hopper, Gondola, Ore, Tank, Flat, etc. Locomotives, all capacities and types.

Send for complete machinery bulletin!

IRON & STEEL PRODUCTS, Inc.
13490 So. Brainard Ave., Chicago, Ill.

FOR SALE OR LEASE

Good Used Koppel
Air Dump Cars
Steel Bodies

All Reconditioned Our Works
13 cars 20 cu. yd.—40 tons Cap.
Lifting Sides
3 cars 20 cu. yd.—40 tons Cap.
Drop Sides
Location—Pittsburgh District
Prices—Exceptionally Attractive

Pressed Steel Car Co., Inc.
(Koppel Division)
330 GRANT ST. PITTSBURGH, PA.

2—**Lorraine 57** Diesel Caterpillar Combination Shovels and Cranes, one year old.
1—**Marion 1-yard** electric Shovel.
2—Chicago Pneumatic, 1300 CFM, synchronous drive **Air Compressor.**
1—**Sullivan WJ3** 17 x 10 x 12, belt driven Air Compressor, 700 CFM with 150 HP motor.
1—6" **Sand Pump** (belt driven).
4—Williams **Hammer Mills.**
5—**Jaw Crushers,** 5" x 10" to 24" x 36".

Send us a list of your surplus equipment.

BRILL EQUIPMENT CORPORATION
183 Varick St. New York, N. Y.

SEND US YOUR INQUIRIES

¾ yd. **Northwest** No. 3 Gas Shovel & Dragline.
45 HP **Cummins;** 80, 100, 120 and 180 HP **Fairbanks** and **Atlas** Diesel Power Units.
2 **Buda** 80/150 HP Power Units. Oil-Gas-Gasoline.
150 HP Scotch Marine Type **Boiler.** Retubed.
14x8x14" **Ingersoll Rand** Air Compressor and 100 HP motor or engine. Also 1050 ft.
Hoists—2 and 3 Drum. Steam-Electric-Gasoline.
2½ yd. **Northwest** 80D Diesel Quarry Shovel.
All Sizes—Crushers—Shovels—Cranes—Compressors

MISSISSIPPI VALLEY EQUIPMENT CO.
315 LOCUST ST. ST. LOUIS, MO.

DIESEL GENERATOR PLANT

SIX 360 HORSE-POWER UNITS

2160 HORSE-POWER

Individual Units Can Be Purchased.
Immediately Available for Re-Installation and Service.
Inspection in Operation. Full Information on Request.

A. G. Schoonmaker Corporation
38 Hudson St. Phone Bergen 4-5300 Jersey City, N. J.

NEW AND USED PIPE FOR EVERY PURPOSE

Large stocks carried everywhere for spot shipment

Jos. Greenspon's Son Pipe Corp.
National Stock Yds. (St. Clair Co.) Ill.

ELECTRICAL MACHINERY

Motors and Generators, A.C. and D.C., for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

V. M. NUSSBAUM & CO.
Fort Wayne, Indiana

HYDRATORS
3 Kityer & Schultless Hydrators.
AIR COMPRESSORS
BELTED: 355, 528, 676, 1000, 1300 & 1570 Ft.
ELECTRIC: 478, 676, 907, 1302, 1722 & 2200 Ft.
DIESEL: 603, 807 & 1000 Ft.
PORTABLE GAS: 110,160,220,310,540 & 1300 Ft.
STEAM: 49, 310, 528, 1300, 2200 & 3600 Ft.
CLAMSHELL BUCKETS, SKIPS & GRAPPLES
Owen R. A. & H. Stone Grapples.
2 Yd. OWEN Type B Material Handling.
1½ Yd., 1 Yd. & ¾ Yd. HAYWARD Class E.
48 Steel Skips 6½ x 6 x 2½.
5 Ton Bucyrus Rack Grabs.
CRANES AND DRAGLINES
¾ Yd. 5 Ton O. & S. 30 Ft. Boom.
12 Ton NORTHWEST 50 Ft. Boom Gas.
25 Ton BROWNING & 30 Ton AMERICAN Loco.
25 Ton LINK BELT K-45 Electric, 70 Ft. Boom.
CATERPILLAR SHOVELS
¾ Yd. Bucyrus 10B Electric & ⅝ yd. Nisley Gas.
2 Yd. Marion Steam Shovel.
¾ Yd.,1¼ Yd.,2 Yd. & 4 Yd. MARION Electrics.
1 Yd. NORTHWEST Gas.
1½ Yd. BUCYRUS 41B Steamer.
4 Yd. Bucyrus 120B Electric. Also 3 yd. Erie Elec.
DUMP CARS
46—KOPPEL 1½ Yd. 24 & 30 In. Ga.,V Shaped.
15—2 Yd., 3 Yd., 4 Yd., 6 Yd., 12 Yd., 36 In. Ga.
20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd.Cap.
15—Std. Ga. 50 Ton Battleship Gondolas.
FLAT CARS
9—50 ton std. ga. heavy duty flat cars.
HOISTING ENGINES
Gas: 15, 30, 60, 100 & 120 HP.
Electric: 30, 52, 80, 100 & 150 HP.
Steam: 6¼x8, 7x10, 8¼x10, 10x12, 12x14.
DIESEL UNITS
75, 90, 180, 240 HP F. M. Engines.
110 HP Ingersoll Rand Engine.
175 KVA Worthington 3/60/2300.
275 KVA Fairbanks 3/60/2300.
BALL, ROD AND TUBE MILLS
6x8 Pebble Mill & 5x5 Batch Mill.
3'x8" & 5'x22" HARDINGE CON. Dry Ball Mill.
3'x30" HARDINGE CONICAL Wet Ball Mill.
6'x22" HARDINGE CONICAL Pebble Mill.
8'x22" HARDINGE CONICAL Ball or Pebble Mill.
4x8, 8x6 & 10x9 Straight Ball Mills.
4x16, 5x18 & 5x22 Tube Mills & 6'x22'.
3½x8 & 5x7 Air Swept Tube Mills.
2x4½, 3x10 & 5x12 ROD MILLS.
PULVERIZERS
JEFFERY 24x20 & 1¼ Sturtevant R.R.
RAYMOND Auto. Pulverizer No. 0000, 0 & 3.
RAYMOND Imp Mills No. 4, 32 & 55.
GRUENDLER XXR Mill & Jay Bee No. 3 & 4.
RAYMOND 4 & 5 ROLL MILLS & 5 ft.Chaser M.
STEEL STORAGE TANKS
10,000 Gal., 15,000 Gal. & 20,000 Gal. Cap.
MATERIAL BIN
116 Ton Blaw Knox 2 Compt.
400 BARREL CEMENT BIN
400 Barrel Butler Portable Steel Cement Bin with Fuller automatic batcher, push button control.
SEPARATORS AND COLLECTORS
Gayco 5 ft., 12 ft. and 14 ft. Separators.
Type 360 Sly 8x24,8x52 and 16x42 Dust Collectors.
ROLL CRUSHERS
36x60 Fairmount & 36x16 Allis Chalmers.
JAW CRUSHERS
10x8, 13x7¼, 14x7, 15x9, 15x10, 16x9,16x12,16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 26x12,30x15,30x13, 36x15, 36x30, 36x18, 36x14, 36x9,36x6,36x10,36x24, 42x9, 48x42, 48x36, 60x42, 84x66, 36x16, 9x36.
CONE & GYRATORY CRUSHERS
42 in. McCully Mammoth Gyratory.
5 No. 19, 25, 37 & 49 Kennedy.
18 in.,24 in.,30 in.,36 in.and 48 in.Symons Disc.
4—10 TZ Traylor 4 ft. Gyratory.
4—Nos. 5, 3 & 6 Austin Gyratory.
2—Traylor T-12 Bulldog Gyratory, also 16 inch.
8 in. Traylor T. Gyratory.
17 Gates K—Nos. 2, 4, 5, 6, 7½, 8 & 9½.
10 Inch Austin Model 105.
10 & 13 Inch Superior McCullys.
SYNCHRONOUS MOTOR GENERATORS
100 K.W. RIDGWAY 3/60/2200-250-275 volt, 1200 rpm.
150 K.W. GEN. ELEC. 3/60/2200-250-275 v., 1200 rpm.
200 K.W.RIDGWAY 3/60/2200-250-275v.,900 rpm.
SLIP RING MOTORS
52 H. P. GEN ELEC. 3/60/440 v., 1200 rpm.
(3) 100 H.P.GEN.ELEC.3/60/440v.,900-1200 rpm.
CONVEYOR PARTS
BELT: 1000 Ft.60 In.,700 Ft.40 In.,600 Ft.36 In., 800 Ft.30 In.,1642 Ft.24 In.,517 Ft.20 In., 997 Ft.18 In., 500 Ft.16 In.,900 Ft.14 In
IDLERS: 54 In.,42 In.,36 In.,30 In.,24 In.,20 In.,18 In.,16 In. & 14 In.
Head & Tail—Pulleys—Takeup for all sizes.
Steel Frames: 2,000 Ft.24 In.,30 In.& 36 In.Sections
ROTARY DRYERS AND KILNS
36 In.x20 Ft., 3 Ft.x30 Ft., 4 Ft.x30 Ft., 54 In. x 30 Ft.,42 In.x24 Ft.,5 Ft.x30 Ft.,5 Ft.x16 Ft.,5 Ft.x60 Ft., 6 Ft.x60 Ft.,6 Ft.x20 Ft., 6 Ft.x70 Ft.
RUBBER HOSE
Air ¾ to 1½ in., Water ⅝ to 10 in.
STEEL DERRICKS
GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft Boom,25 Ton 100 Ft Boom,75 Ton 135 Ft.Boom
LOCOMOTIVES
GASOLINE: 9 Ton 5 Ton 8 Ton,12 14,and 30 Ton.
STEAM: 9 Ton,20 Ton 40 Ton 60 Ton & 90 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 40 Ton.
SCREENS
VIBRATING: 2x4, 3x8, 12x8, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72 & 4x12, 1, 2 & 3 Deck
HUMMER, ROTEX, NIAGARA & ROBINS.
REVOLVING: 2x12, 3x18, 3½x18, 3x24, 4x16,4x20, 4x22, 4x24, 5x30, 5x20, 6x30.
COMPLETE PLANTS BOUGHT AND SOLD

R. C. STANHOPE, INC.

(Cable Address: "STANEQUIP" New York)
875 Sixth Avenue, New York, N. Y.

Air Compressors

1500′ I-R, XB-2, Belted Ind. Mt. 2200 V., 100 lb.
1302′ I-R, PRE-2,Dir.Con.Syn.Mt.440 V.,100 lb.
1052′ I-R, XCB, Belted Syn. Mt. 2200 V., 100 lb.
1050′ I-R, PRE-2,Dir.Con.Syn.Mt.2300 V.,100 lb.

Synch. Motor Generators

750 KW WEST.,125/250 V.,2400 A.C.,900 RPM
300 KW G.E.,125/250 V.,2300/4000 A.C.,1200 RPM
300 KW G.E., 250 V.,2300/4000 A.C.,720 RPM
200 KW G.E.,250 V.,2300/4000 A.C.,1200 RPM
200 KW G.E.,550 V.,2300/4000 A.C.,1200 RPM
150 KW WEST.,250 V.,2300/4000 A.C.,1200 RPM
100 KW G.E.,250 V.,2300 A.C.,1200 RPM

LOCOMOTIVES

JEFFREY, GENERAL ELECTRIC, GOODMAN, WESTINGHOUSE, MANCHA & ATLAS, TROLLEY & BATTERY TYPES. ALL WEIGHTS AND GAUGES.

Each unit listed above is owned by us and is only a small part of our large stock, consisting of Synchronous Converters, Transformers, Motors, Coal Crushers and Wheel Presses.

WHAT HAVE YOU FOR SALE?

Wallace E. Kirk Company
INCORPORATED
502-F Grant Building Pittsburgh, Pa.

FOR SALE

45 Ton Plymouth gas-electric locomotive type 0-4-4-0 standard gauge.
22 Ton Plymouth gasoline locomotive type 0-4-0 standard gauge.
8 Ton Plymouth gasoline locomotive type 0-4-0 standard gauge.
40 Ton American four wheel saddle tank locomotive, 14x22" cylinders, standard gauge.
40 Ton Vulcan four wheel saddle tank locomotive, 14x20" cylinders, standard gauge.
30 Ton American four wheel saddle tank locomotive, 12x18" cylinders, standard gauge.
35 Ton McMyler eight wheel steam locomotive crane, 70′ boom.

Complete stock list on request.

Birmingham Rail & Locomotive Co.
BIRMINGHAM, ALABAMA

BELT CONVEYORS IN STOCK
36" Belt, Idlers and Assemblies
36" L-B Self-Contained Apron Feeder
30" Belt, Idlers & H & T Assemblies
24"x38' Belt Conveyor on Steel Frame
24" Gravity Take-Ups
24" & 18" Hand-Propelled Belt Trippers
2—24" Reciprocating Plate Feeders
16" & 14" Belt, Idlers & Pulleys
12"-36" Friction and Conveyor Belt

BUCKET ELEVATORS IN STOCK
10"x32' Enclosed Type Chain Elevator
14"x32' Open Type Chain Elevator
Elevator Buckets for Belt and Chain
14" New 8-ply Rubber Covered Belt

CRUSHERS, MILLS & GRIZZLYS
Telsmith No. 30 Rotary Grizzly
Hardinge 8-ft. x 22" Pebble Mill
Traylor Bulldog 8" Gyratory Crusher
28"x30" Corrugated Mang. Crushing Rolls

VIBRATING SCREENS IN STOCK
3x5′ Multirap 1-deck, Wet Or Dry Screen
2—3x5 Hummers 1-deck, V-16 Vibrators
2—3x5 Hummers 2-deck, V-16 Vibrators
3x6 Plat-O 1-deck, with V-Belt Drive
2—4x5 Hummers 2-deck, V-16 Vibrators
4x5 Hummer 2-deck, with V-40 Vibrator
3—4x8 Robins Gyrex 2-deck Screens
2—4x8 Robins Perfex Shaking Screens
3x5 & 4x5 New Lot Wire Screen Sections

G. A. UNVERZAGT
15 Park Row, New York City

RAILS—1 Ton or 1000
NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—New—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
Buy from One Source—Save Time and Money.
'Phone, Write or Wire
L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

FOR SALE

One 13 x 30 Earle C. Bacon reduction jaw crusher, good condition. $1000.00 F.O.B. southern New York. Also 12 x 18 Acme jaw crusher, many new parts, and 16 x 36 Worthington crushing rolls. **Box No. 904, Care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.**

Used Equipment Wanted

MIDDLE WEST STONE PRODUCER PROPOSES TO BUILD:

- 1 Cupola Rock Wool Plant
  and
- 2 Lime Kilns with Hydrating Machinery with capacity of about 1 and ½ tons per hour.

What have you in the way of equipment for such installations? Send replies to box 906, Care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.

WANTED

4 ft. Symons Cone Crusher; state if fine or coarse bowl, serial number, condition, location and price. Address Box 905, care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.

WILL PAY CASH FOR GOOD:
(1) Lime Hydrating Outfit.
Rotary Kilns and Dryers.
Hammermills, Pulverizers and Rolls.
Ball, Rod and Tube Mills.
Air Compressors: Diesel, Std., Elec. & Steam.
Crushers: Jaw—Gyratory and Cone.

TIDEWATER EQUIPT. & MACHY. CORP.
101 West 31st Street NEW YORK, N. Y.

Positions Vacant

HELP WANTED

Rock wool operator experienced in production of raw wool and commercial products manufactured from it. Must have experience in handling men and organizing ability, and must be qualified to assume superintendency of Rock Wool Plant. Apply Box 900, Care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.

MAN WITH EXPERIENCE IN MASONRY Cement Manufacture, preferably chemist, to do research and promotional work for several months. May lead to permanent position with old established company. State experience, former employers, and salary desired. Send replies to Box 901, Rock Products, 205 W. Wacker Drive, Chicago, Illinois.

Business Opportunities

FOR SALE

By owner, Sand and Gravel Business, in Northern California. Fully equipped and running. Situated on railroad and state highway. Gravel deposit unlimited. $3,500 will handle. Address G. Werner, Gen. Del., Sacramento, Calif.

FOR SALE

Up to 5000 Acres of Tennessee

PHOSPHATE LANDS

Mineral Rights or Fee Simple

BEST AND SAFEST PLACE TO INVEST IDLE MONEY

H. D. Ruhm — **Columbia, Tenn.**

CHANCE OF A LIFE-TIME

I will give 25% interest in rock business in Florida to party capable of taking complete charge of mining and crushing plants, who can furnish mining equipment. Demand now surpasses my hand method of quarrying. Have over million cubic yards. Possibilities unlimited. Give comprehensive information in your reply as to age, experience, past connections, present connection if any, equipment you have, etc. Reply Box 907, care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.

Positions Wanted

POSITION WANTED

Cement Plant Executive — Age 35 — With twenty years' experience as Chemist, Superintendent and Manager, and thoroughly acquainted with Portland, special and masonry cement manufacture, desires position with progressive concern. Reply to **Box 894, Rock Products, 205 W. Wacker Drive, Chicago, Illinois.**

PRODUCTION SUPT. DESIRES POSITION with Concrete Pipe plant. Wide experience with Concrete Pipe Machinery and Cast Pipe. Know how to handle men and keep costs down and get quality product. Twenty-three years in Concrete Pipe plants. Ten years with last employer. Can keep any machinery running. Best of references. Address Box 903, Care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.

DIESEL ENGINEER and SERVICE Man, 20 years experience. Can take charge of complete installations, rebuilding and maintenance. Write for references and full particulars. Address Box 902, Care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.

Consulting Engineers

F. M. WELCH ENGINEERING SERVICE

Consulting Engineers — **Grossville, Ohio**

Designers of GRAVEL PLANTS for 30 years

SMALL PLANTS to meet local conditions with flexibility, ample crushing, minimum labor, low first cost and maintenance.

LARGE MODERN PLANTS for metropolitan areas.

GROUND STORAGE Plants.

OLD PLANTS modernized.

CONSULTATION — REPORTS

WE LOOK INTO THE EARTH

By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.

PENNSYLVANIA DRILLING CO.

Drilling Contractors

Pittsburgh, Pa.

O. C. Hoffman, Pres. — **L. H. Hoffman, Treas.**

DIAMOND CORE DRILLING

HOFFMAN BROS. DRILLING COMPANY

PUNXSUTAWNEY, PA.

We drill for any mineral. We have more than forty steam, electric and gasoline drills, adapted for any job. Satisfactory cores guaranteed. Our prices are right.

Established 1902 - - - - **Telephone No. 382**

H. J. BROWN

CONSULTING ENGINEER

35 Doane Street — **Boston, Massachusetts**

Specializing in Gypsum Plants and in the Mining, Quarrying and Manufacture of Gypsum Products.

Consultation — **Design**
Examinations — **Construction**
Reports — **Supervision**

BUYERS' FREE SERVICE

RESEARCH SERVICE DEPARTMENT, *Rock Products*, 205 W. Wacker Drive, Chicago, Ill.

We are in the market for and would like to receive prices and literature on the items checked below:

....Admixtures
....Aerial Tramways
....Aggregates (Special)
....Agitators
....Air Compressors
....Air Separators
....Architectural Trimstone Molds
....Ash Receptacle Molds
....Ash & Refuse Handling Equipment
....Asphalt Mixing Plants
....Backdiggers
....Backfillers
....Bags
....Bagging Machines
....Balls (Grinding)
....Barges
....Batchers (Weighing)
....Bearings
....Belting (Conveyor & Elevator)
....Bins (Storage)
....Blasting Supplies
....Block Machines, Building
....Boats
....Brick Machines & Molds
....Buckets
....Building Tile Machines
....Bulk Cement Batching Plants
....Bulk Cement Storage Plants
....Bulldozers
....Bullscrapers
....Burial Vault Forms
....Calcining Equipment
....Calcium Chloride
....Cars (Industrial)
....Catch Basin Block Machines
....Cement Plants
....Cement Colors
....Cement Process
....Central Mixing Plants (Concrete)
....Chimney Block Machines & Molds
....Clarifiers
....Classifiers
....Coal Pulverizing Equipment
....Concentrators
....Concrete Mixers
....Concrete Paints & Coatings
....Concrete Waterproofing & Dampproofing
....Conveyors
....Conveyor Idlers and Rolls
....Coolers
....Corn Crib Block and Tile Machines
....Correcting Basins
....Cranes (Crawler & Locomotive)
....Crushers
....Crushing & Screening Plants (Portable)
....Culvert Pipe Machines & Molds (Concrete)
....Curing Equipment
....Curb Forms (Concrete)
....Dedusters
....Dehydrators
....Derricks
....Dewatering Equipment
....Dippers & Teeth
....Disintegrators
....Dragline Cableway Excavators
....Drain Tile Machines
....Dredges
....Dredge Pumps
....Drills (Rock)
....Drill Bits
....Drill Sharpening Machines
....Drill Steel
....Dryers
....Dust Collecting Systems
....Dust Precipitators
....Dust Recovery Plants
....Dynamite
....Electric Motors
....Electrostatic Separators
....Elevators
....Engineering Service (Consulting & Designing)
....Engines (Diesel, Gasoline, Steam)
....Feeders
....Fence Post Molds & Machines (Concrete)
....Floor Tile Machines (Concrete)
....Garbage Receptacle Molds (Concrete)
....Garden Furniture Molds (Concrete)
....Generators & Motor Generator Sets
....Greenhouse Bench Forms (Concrete)
....Guns (Hydraulic)
....Gutter Block Machines (Concrete)
....Hoists
....Hoppers
....Hose
....Hydrators (Lime)
....Joist & Slab Machines (Concrete)
....Kilns (Rotary, Shaft, Vertical)
....Laboratory Apparatus
....Laundry Tub Molds (Concrete)
....Light Post & Standard Forms
....Lime (Hydrated)
....Lime Handling Equipment
....Lime Plants
....Lime Putty Plants
....Loaders
....Locomotives
....Mills (Ball, Compartment, Emery, Hammer, Rod, Roll, Tube)
....Mortar Mixers
....Pallets (Steel, Wood)
....Pans, Grinding (Wet & Dry)
....Perforated Metal
....Pipe Molds and Machines (Concrete)
....Pipe
....Plaster Mixers
....Pontoons
....Pulverizers
....Pumps (Pulverized Material)
....Railway Equipment
....Rectifiers
....Recuperators
....Refractories
....Rewashers (Screw)
....Rock Wool Cupolas
....Roofing Tile Machines
....Sand Drags
....Sand & Gravel Plants
....Sand Lime Brick Machinery
....Sand Settling Tanks
....Scales
....Scrapers (Power Drag)
....Screens (Revolving, Vibrating, Etc.)
....Seal Rings
....Septic Tank Molds (Concrete)
....Sewer Pipe Machines (Concrete)
....Shale Planers
....Shovels (Power)
....Sidewalk Forms
....Silo Forms (Concrete)
....Silos (Storage)
....Silo Stave Machines
....Slakers (Rotary)
....Slurry Mixers
....Slurry Pumps
....Slurry Separators
....Slurry Thickeners
....Step Forms (Concrete)
....Tampers (Hand & Power)
....Tanks (Storage)
....Tractors
....Trucks (Agitator)
....Trucks (Dump)
....Trucks (Industrial)
....Trucks (Mixer Body)
....Unloaders
....Unloaders (Boat)
....Unloaders (Box Car)
....Wagons (Dump)
....Wall Forms & Machines (Concrete)
....Washers (Sand, Gravel & Stone)
....Welding & Cutting Equipment
....Well Curbing Machine & Molds (Concrete)
....Wire Cloth
....Wire (Copper, Iron & Steel)
....Wire Rope

Firm Name _____

Individual _____ *Title* _____

Address _____

City _____ *State* _____

DROPPING SHOCKS Absorbed by—

unique Owen patented stops — four heavy reinforced lugs, cast integral with and extending from each hinge casting—slipping action of lugs on curvature of counterweight absorbs most severe of dropping shocks—holds bucket in correct position for efficient digging.

THE OWEN BUCKET CO.
6040 BREAKWATER AVE., CLEVELAND, OHIO
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Cal.

Index to Advertisers

American Cable Co., Inc.... Inside Back Cover
American Pulverizer Co.. 93
American Steel & Wire Co. 20
Anchor Concrete Machy. Co. 62
Armstrong-Bray & Co... 98
Athey Truss Wheel Co.... 3
Atlas Powder Co. 105

Babcock & Wilcox Co.... .....Front Cover
Bacon, Earle C., Inc..... 77
Barber-Greene Co. 76
Besser Mfg. Co..... 58
Bethlehem Steel Co..... 6
Blaw-Knox Co. 90, 97
Bucyrus-Erie Co. ....Outside Back Cover

Caterpillar Tractor Co.... 19
Cement Process Corp..... 97
Chase Fdry. & Mfg. Co.... 60
Chicago Bridge & Iron Co. 91
Chicago Perforating Co... 99
Chicago Steel Foundry Co. 79
Classified Advertising 100-103
Cleveland Wire Cloth & Mfg. Co. 104
Columbia Steel Co..... 20
Combustion Engineering Co., Inc. 11
Commercial Shearing & Stamping Co. 60
Cummins Engine Co..... 83

Davenport-Besler Corp. . 90
Dempster Brothers, Inc... 92
Dixie Machinery Mfg. Co. 78

Eagle Iron Works..... 89
Ensign-Bickford Co. 21

Flexible Steel Lacing Co.. 97
Frog Switch & Mfg. Co.. 77
Fuller Co. 8, 9

Gardner-Denver Co. 88
General Electric Co..... 87
Gulf Refining Co..... 85

Hardinge Co., Inc..... 18
Harnischfeger Corp. 79
Harrington & King Perf. Co. 79
Hayward Co. 99
Hazard Wire Rope Div. .....Inside Back Cover
Hetherington & Berner, Inc. 98

Jackson & Church Co..... 65
Jaeger Machine Co..... 95
Jeffrey Mfg. Co..... 95

Kent Machine Co..... 66
Kern, Fred T., Co..... 74
Koehring Co. 5

Laughlin, Thomas, Co.... 78
Leschen, A., & Sons Rope Co. 77
Lewistown Foundry & Mach. Co. 96
Lima Locomotive Works, Inc. (Shovel & Crane Div.) 71
Link-Belt Co. 95
Ludlow-Saylor Wire Co.. 95

McLanahan & Stone Corp. 98
Marietta Concrete Corp... 92
Marion Steam Shovel Co. 13
Merrick Scale Mfg. Co.... 71
Mepham, George S., & Co. 66
Multiplex Concrete Machy. Co. 68

National Supply Co..... 10
Nordberg Mfg. Co..... 12
Northern Blower Co..... 93
Northwest Engineering Co. 17

Owen Bucket Co.....104

Pennsylvania Crusher Co. 98
Pioneer Engineering Works, Inc. 1
Portland Cement Assn... 60
Productive Equipment Corp. 96

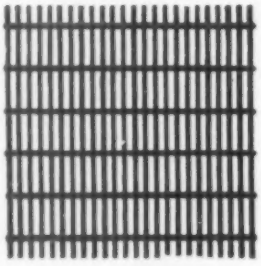
Raymond Pulv. Div..... 11
Research Corp. 16
Robins Conveying Belt Co. 22
Roebling's, John A., Sons Co. 75
Ross Screen & Feeder Co.. 76
Ryerson, Jos. T., & Son, Inc. 99

Sauerman Brothers 94
Schaffer Poidometer Co... 78
Screen Equipment Co..... 78
Simplicity Engineering Co. 80
Sly, W. W., Mfg. Co..... 89
Smidth, F. L., & Co..... 14
Smith Engineering Works .....Inside Front Cover
Stearns Mfg. Co..... 62
Suburban Sanitation Systems Co. 66
Superior Diesel 10

Texas Co. 4
Thermoid Rubber Co.....106
Thew Shovel Co..... 15
Traylor Engineering & Mfg. Co. 7
Tyler, W. S., Co..... 91

U. S. Steel Corp..... 20
Universal Concrete Pipe Co., Inc. 66
Universal Vibrating Screen Co. 76

Western Precipitation Corp. 16
Wilfley, A. R., & Sons, Inc. 99
Williams Patent Crusher & Pulv. Co..... 91



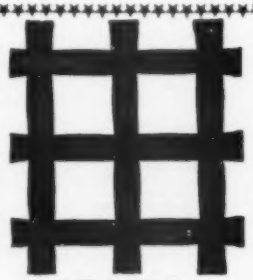
ALLOY No. 2

STAR PERFORMERS

CLEVELAND SCREENS are star performers—returning larger capacities, increased profits and more accurate separations at lower cost. Cleveland Screens save money with the initial investment because, if they are made of the longer-wearing, wear-resisting ALLOY NO. 2—Cleveland Screens stay on the job long after ordinary screens would have been replaced.

★ ★

THE CLEVELAND WIRE CLOTH & MFG. CO.
3574 E. 78TH STREET . . . . . CLEVELAND, OHIO



2 Mesh .162 Ga.

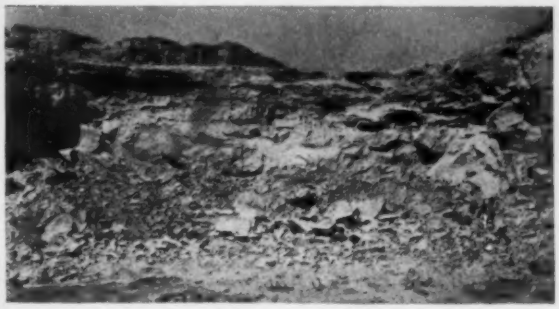
MORE PROFITS FOR YOU

SHOWING *the* "MAN FROM MISSOURI"

. . . and the candid camera tells the story

1 In Klondike, Missouri, the Tavern Rock Sand Company was anxious to reduce blasting costs. They called in the Atlas representative, who recommended Atlas Apex—the new type quarry explosive. In October 1936, the first Apex "shot" was made. Tavern Rock has been a steady Apex user ever since.

2 Dramatic moment of an Apex blast at Tavern Rock. Plant Manager F. J. Ueltzen writes: "By using your Apex in these 'shots,' we find that we are getting very good results, mainly in lifting out the 'bottoms' and reducing secondary shooting to a minimum."



3 The result of an Apex blast—tons of rock ready for the shovel *at lower cost per ton*. Made in five grades—each with three velocities—Atlas Apex meets a wide variety of blasting needs. Let the Atlas representative arrange an Apex demonstration in *your* quarry!

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

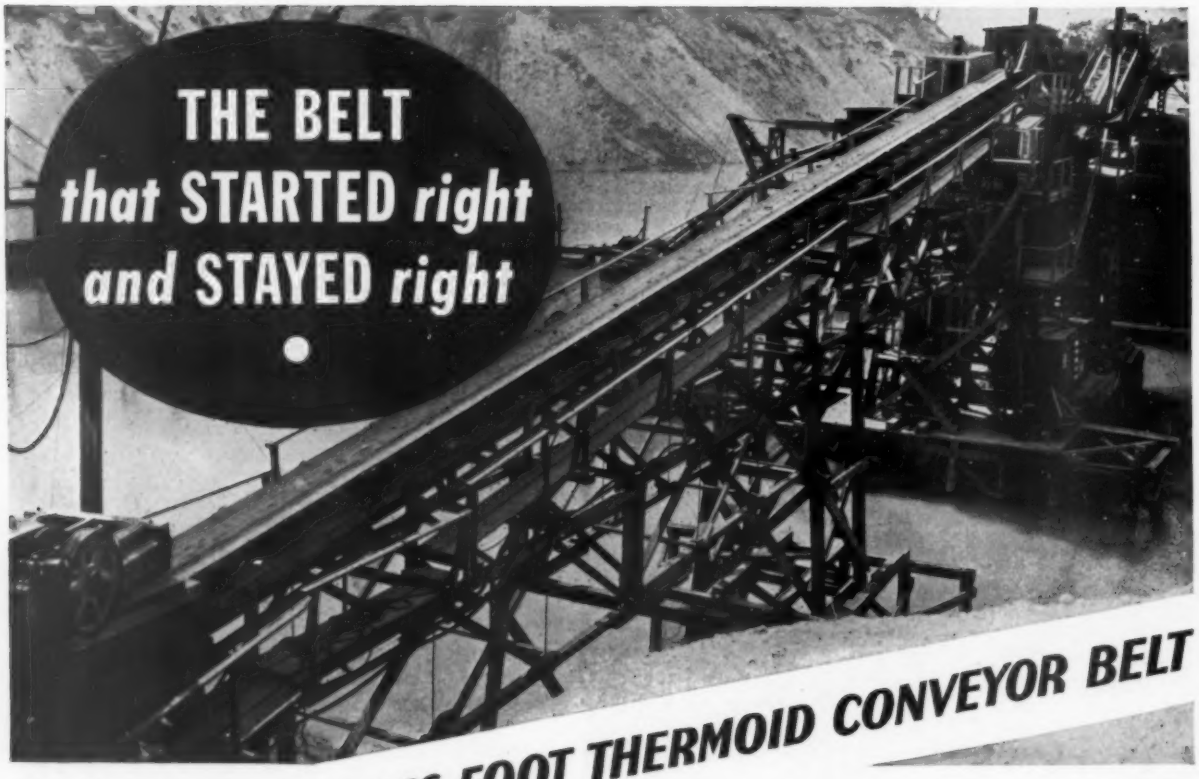
OFFICES

Allentown, Pa.	Houghton, Mich.	Memphis, Tenn.	Pittsburg, Kansas	Seattle, Wash.
Boston, Mass.	Joplin, Mo.	New Orleans, La.	Pittsburgh, Pa.	Spokane, Wash.
Butte, Mont.	Kansas City, Mo.	New York, N. Y.	Portland, Oregon	St. Louis, Mo.
Chicago, Ill.	Knoxville, Tenn.	Philadelphia, Pa.	Salt Lake City, Utah	Tamaqua, Pa.
Denver, Colo.	Los Angeles, Calif.	Picher, Okla.	San Francisco, Calif.	Wilkes-Barre, Pa.

ATLAS

EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES



THE STORY OF A 316 FOOT THERMOID CONVEYOR BELT

Actually it's a story that is far from finished, for at this point the belt is good for uncounted thousands of tons of sand and gravel.

Day in and day out it feeds the vibrating screen all the tonnage it can take . . . without interruption . . . without breakdown. And that's its record from the first minute it started. The operator reports that it was not even necessary to tighten the belt or make any idler adjustments after the installation.

So here's the moral to this "unfinished" story . . . Operators can pay a heavy penalty when they purchase conveyor belting on the basis of cost per foot, rather than calculating the cost per ton of uninterrupted service.

Through years of specialization in the field, Thermoid has developed and can offer the right type of belt for each conveying job. Each type offers the finest that quality raw materials and practical engineering knowledge can give to a belt. The result is longer service life and reduced conveying costs.

For new installations . . . or replacements . . . be sure you specify Thermoid.

THERMOID RUBBER, DIVISION OF THERMOID COMPANY, TRENTON, N. J.

Standard types of belting made by Thermoid:
Transmission Belting
Conveyor Belting
Multiple V Belts
Grader Belting
Canners' Belting
Bucket Elevator Belting

Thermoid

Standard types of hose made by Thermoid:
Air Hose
Water Hose
Steam Hose
Tank Truck Hose
Gasoline Hose
Suction Hose

BELTING · HOSE · PACKINGS · BRAKE LININGS

USE TRU•LAY PREFORMED

Operators everywhere have found that TRU-LAY Preformed Wire Rope will do more work (regardless of kind) for a much longer time.

Regardless of the machine or job, TRU-LAY Preformed invariably lasts longer. It lasts longer because it is a relaxed, preformed rope. It resists kinking, handles easier and has amazing resistance to the fatigue of reverse bending. It spools better and resists rotating in sheave grooves. Being preformed TRU-LAY requires no seizing when cut, will not fly apart when broken. TRU-LAY Preformed is the greater dollar value rope. All American Cable ropes made of Improved Plow Steel are Identified by the Emerald Strand.

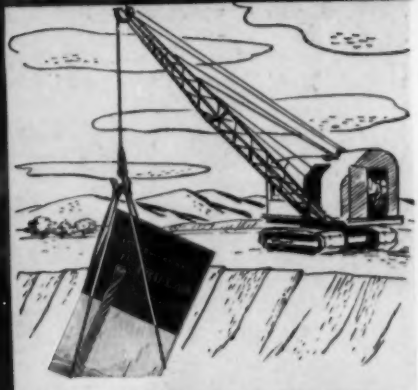
BUY ACCO QUALITY whether American Cable Division's wire ropes and slings—American Chains (Welded or Weldless)—Campbell Abrasive Cutting Machines—Wright Hoists—Page Chain Link Fence—Page Welding Wire—Reading-Pratt & Cady Valves—or any other of the 137 ACCO Quality Products.

See our exhibit in Metals (Products) Building, New York World's Fair

AMERICAN CABLE DIVISION
WILKES-BARRE, PENNSYLVANIA

District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco

GREEN SIGNIFIES SAFETY



GET A LOAD OF THIS, TOO

Here is a 28-page book that is so constructive and worthwhile you will want every man on your job to see and read it. It is far more than an advertisement—it is a "how" and a "why" book. You'll find in it, too, some service report blanks on which you can keep an accurate record of the exact service your rope gives regardless of kind. Send for your copy today.

American Cable Division
American Chain & Cable Co., Inc.
Wilkes-Barre, Pennsylvania

Send me, free, ... copies of your 28-page book "Greater Dollar Value with TRU-LAY Preformed."

Name.....

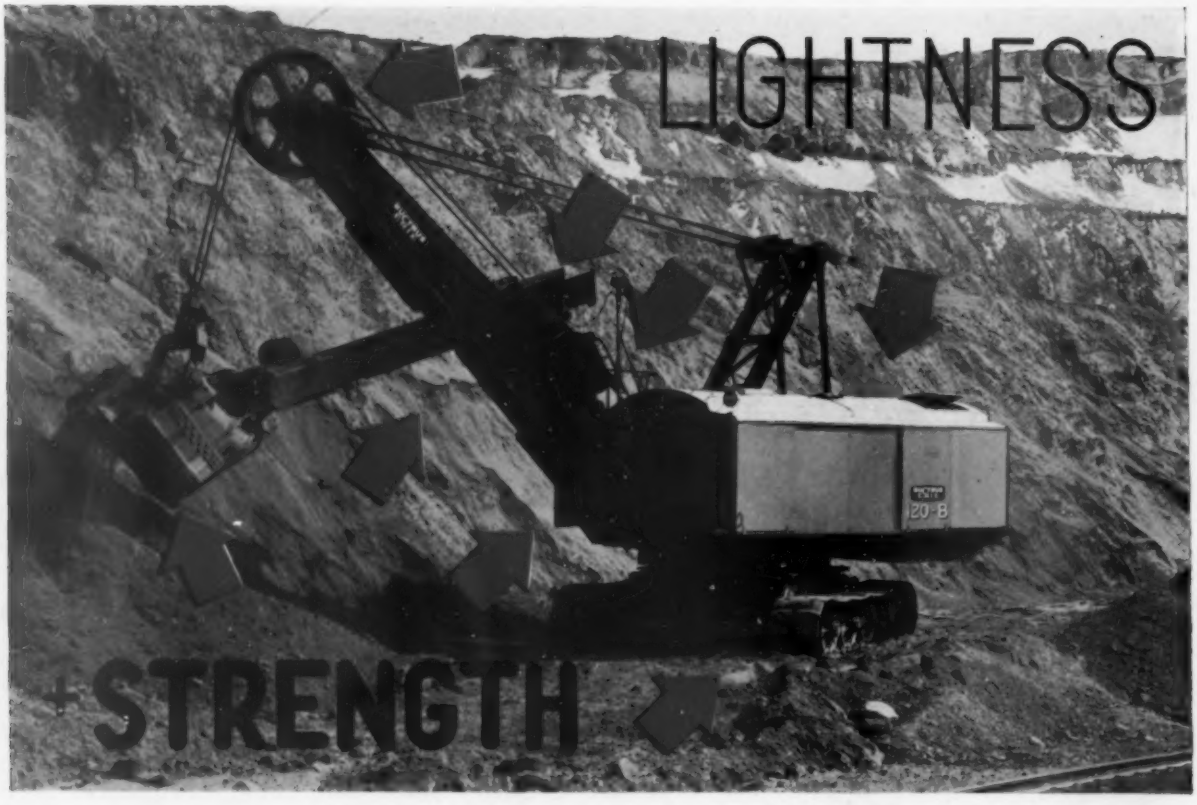
Position.....

Firm.....

Town.....*State*.....

AMERICAN CHAIN & CABLE COMPANY, Inc.

AMERICAN CHAIN DIVISION • AMERICAN CABLE DIVISION • ANDREW C. CAMPBELL DIVISION • FORD CHAIN BLOCK DIVISION • HAZARD WIRE ROPE DIVISION • HIGHLAND IRON AND STEEL DIVISION • MANLEY MANUFACTURING DIVISION • OWEN SILENT SPRING COMPANY, INC. • PAGE STEEL AND WIRE DIVISION • READING-PRATT & CADY DIVISION • READING STEEL CASTING DIVISION • WRIGHT MANUFACTURING DIVISION • IN CANADA: DOMINION CHAIN COMPANY, LTD. • IN ENGLAND: BRITISH WIRE PRODUCTS, LTD. • THE PARSONS CHAIN COMPANY, LTD. • *In Business for Your Safety*



=SPEED!

Designed by experts experienced in building quality excavators, and taking full advantage of special steels, heat-treating and modern welding, today's Bucyrus-Eries give you an unmatched combination of strength and light weight.

The lighter front-end requires less counterweight, less ponderous bulk throughout the machine, to achieve maximum strength in exactly the places where strength is essential. This means faster swing, bigger output and a decreased power bill.

There is a machine in the complete Bucyrus-Erie quarry and mining line to fit your needs. Ask us to show you what Bucyrus-Erie's bigger output can mean in your pit.

BUCYRUS·ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN, U.S.A.